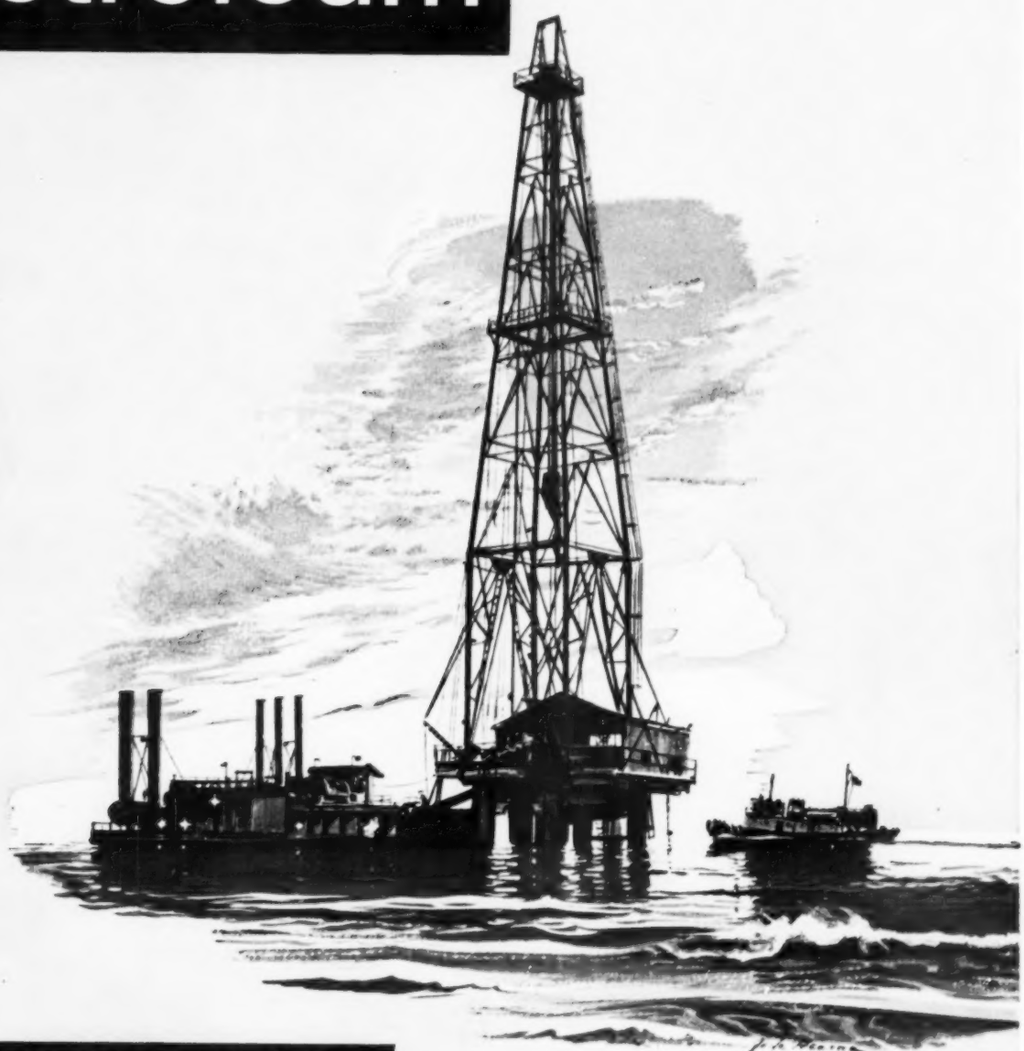
September, 1953

World Petroleum



INTERNATIONAL REVIEW NUMBER

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WARREN

PETROLEUM CORPORATION

TULSA, OKLAHOMA CABLE ADDRESSES: Stavolene, Warren

EXPORT TERMINALS: CORPUS CHRISTI, PORT ARTHUR, BAYTOWN, TEXAS CITY AND WARRENGAS, HOUSTON, TEXAS

It's easy to be sure a Hortonsphere is built to specifications . . .

. . . thanks to your Chicago Bridge & Iron Company Field Welding Supervisor

Every welded tank built by Chicago Bridge & Iron Company has a Field Welding Supervisor, in addition to the Foreman in charge of the job. The welding supervisor checks the operation of welding equipment, sees that the proper number of test plugs are cut and graded, helps to magnaflux or x-ray seams if this is called for in the governing specifications. It is his job to see that your Hortonsphere is built in accordance with or better than the conditions set forth in the specifications.

Field Welding Supervision Service is provided at *no extra cost* on every welded steel structure built by Chicago Bridge & Iron Company. When planning welded steel plate structures of any type, write our nearest office for information, estimates or quotations. Rely on the vast experience and complete facilities of CB&I to provide the best.

Above: Closeup view of a 12,000-bbl. Hortonsphere at a large refinery in Texas. It is designed for a working pressure of 75 lbs. per sq. in. and used to store butane.

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Chicago • Houston • Tulsa • San Francisco • Birmingham • Atlanta • Cleveland • Philadelphia • Pittsburgh • Los Angeles • Boston • Seattle • Detroit
Plants: Birmingham, Chicago, Salt Lake City and Greenville, Pa., U.S.A.
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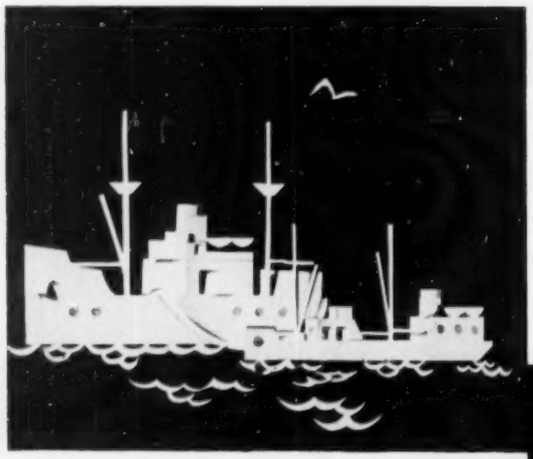
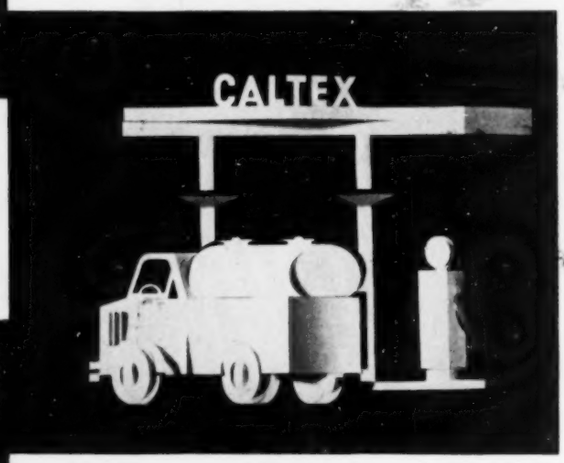


Agriculture, industries and transport systems halfway 'round the world find *Caltex* petroleum products easily available, economical to use. On the seas and highways *Caltex* bunkers, service stations and fueling depots help speed the flow of Eastern Hemisphere trade, bringing jobs and economic well-being to people of 67 lands.



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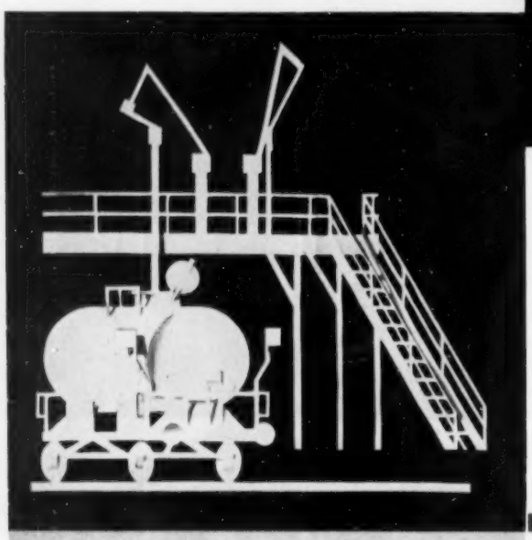

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CALTEX PETROLEUM PRODUCTS

WORLD PETROLEUM for September, 1953. Vol. 24, No. 10. September, 1953. WORLD PETROLEUM is published monthly by Mona Palmer, Trustee under the will of Russell Palmer, 604 Fifth Ave., New York 20, N. Y. Acceptance at East Stroudsburg, Pa., under Section 34.64 P. L. & R. Authorized. Subscription rate: $5.00 per year, single copies $1.00. Copyright 1953, by Mona Palmer, Trustee.

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LINE PIPE
Uniformly satisfactory in service because—
Long lengths save time and trouble
Weldability is outstanding
It bends readily
Line up characteristics are excellent

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●One important reason why Youngstown Electric Weld Pipe is so uniformly satisfactory is that its production is under the sole supervision of a single integrated organization—from mining the ore to shipping the finished product.

Youngstown Electric Weld Pipe for the oil and gas industry is being made in sizes up to 22" OD and in grades as high as X52. For further information, phone or write our nearest District Sales Office.

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In Perforating, Logging, and Fishing Tool Services

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NEW WAYS OF DOING THINGS

Latest News About New Tools, Techniques and Services

NEW

McCULLOUGH *Radiation Well Logger with* SCINTILLOMETER (GAMMA RAY AND NEUTRON LOGS)

Accurate, Reliable, Consistent and Stable Logs on Every Run in the Well

Present day well completion programs are often based solely on logging information. Therefore, that information must be accurate and consistently reliable. The security of your entire drilling investment depends on the dependability of the information given by the log.

That's why operators everywhere are specifying the amazing new McCullough Radiation Well Logger with Scintillometer. It is the most accurate and reliable logging instrument available to the oil industry. It is a stable instrument, and because of its stability, it is consistently reliable—one or ten trips in the same well, you'll always get the same answer.

Here are some of the reasons why the McCullough Radiation Well Logger with Scintillometer gets such accurate, dependable results:

1. The Scintillometer is very short compared to the length of gaseous type counters. This enables the measurement of formations with a great deal more detail. It will measure and define very thin beds that would be averaged out with the longer counters.

2. The efficiency of the Scintillometer in measuring radiations approaches 100%. Gaseous type counters may have an efficiency in the order of 2% or less.

3. As a result of the short length and high efficiency of the Scintillometer, a much more detailed log can be produced at a faster logging speed than with other methods.

4. The Scintillometer responds only to external excitation and thus can be calibrated on an absolute scale. This scale is in International Units and assures a more accurate quantitative interpretation.

5. Because of the extreme stability of our equipment, we are able to duplicate successive runs in the same well with accuracy.

6. Characteristics such as time constant and sensitivity are controlled at the surface. Thus, these variables can be set to provide the operator with as much or as little detail in his log as he desires.

7. The Scintillometer will record the entire range of gamma radiations, or only a certain band within the range can be recorded if desired.

8. It has no instrument, temperature nor discernable cosmic drift and can be used as a valuable reference tool.

9. Simultaneous recording of a collar log simplifies "pin-point" perforating later.

10. The original record is reproduced as the final log—no retouching nor tracing is necessary.

THE McCULLOUGH RADIATION WELL LOGGER WITH SCINTILLOMETER (GAMMA RAY AND NEUTRON) IS AVAILABLE IN MOST ACTIVE OIL FIELDS—CALL YOUR McCULLOUGH SERVICE ENGINEER FOR COMPLETE INFORMATION.

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A G-E Engineered Power System Helps Maintain High-Output Continuity

These are complete General Electric units: transformer, load-ratio control panel with voltage regulating relay; metal-clad switchgear with vertical-lift magneblast air circuit breakers and necessary relaying and instrumentation in *one single, fully-coordinated unit.*

BRINGS THESE BENEFITS TO YOUR REFINERY!

1. FLEXIBILITY. "Building-block design" permits capacity to be added to — or removed — quickly and easily. Load shifts can be met simply by shifting the standardized G-E units or adding additional units.

2. REDUCED SYSTEM COSTS. From planning to installation, G-E substations save you money. You order a *complete* unit . . . no money or time lost in ordering and coordinating separate components. Repetitive manufacture gives you a superior substation at lower cost. And you save on installation because G-E units are shipped ready for easy, economical installation.

3. LONG, RUGGED SERVICE. Components are first-quality, continually checked to rigid standards on the repetitive production line. Since each substation is a *unit*, it is coordinated by expert technicians at the *factory*, to insure lasting performance.

• • •

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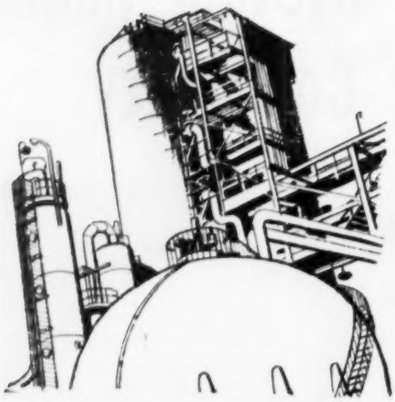
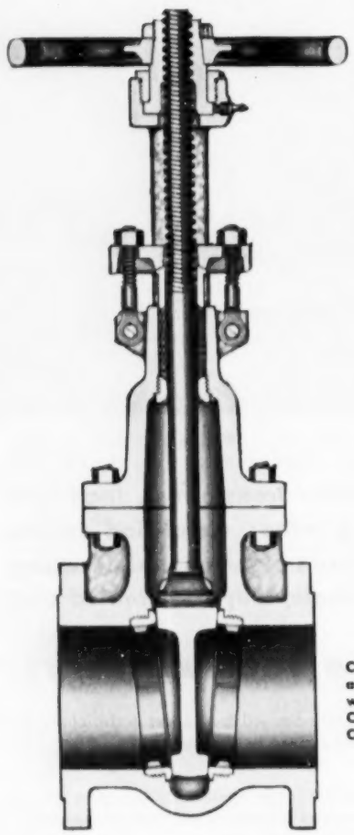


Workhorse of the Oil Industry

CRANE 150-POUND STEEL GATE VALVES



In every industry there's one outstanding valve that bears the brunt of service. In petroleum, it's the 150-pound cast steel wedge gate. As a pioneer in its development, Crane is proud to have helped set the high quality standards of modern steel valve design.

Take Crane *Exelloy*—"X" trim—for example. In the early days of oil refining, many metals and metal combinations were tried for seating surfaces and found wanting. Crane *Exelloy*, adopted more than 25 years ago, set a new record of usefulness and satisfaction. So remarkable was its performance that this class of material (roughly designated as 11½ to 13 per cent chrome) became the recognized staple valve trim in the petroleum industry.

And yet, Crane still manages to come up with "X" trim of superior quality. It's done with bars and billets that meet the most rigid specifications, and with manufacturing techniques that develop the best characteristics of material for each component part.

It's you, the Thrifty Valve Buyer, who benefits from Crane Co.'s steady pioneering in better valve design. You get bigger value through longer-lasting service and lower maintenance cost. And you get it in every Crane valve.

Crane 150-Pound Cast Steel Gate Valves are available in a complete range of sizes with screwed, flanged, or welding ends. Check your Crane Catalog—or ask your Crane Representative for full information.

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Crane Limited,
1170 Beaver Hall Square,
Montreal, Quebec

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

We're always glad to lend you a helping hand

This picture shows the Hindu triad performing the Dance of the Universe. The many different arms symbolize its many different powers—and remind us that Ethyl Corporation seems to have developed a few extra arms, too.

In thirty years of working with the petroleum industry, we have built up a powerful advertising arm, which was one of the decisive factors in stimulating public demand for premium gasoline, and is today helping you increase sales of this extra-quality product. And we've backed up this arm with another which fashions movies, booklets, demonstrations, and other selling aids to help your service station people increase premium sales.

Then there's the Ethyl research arm which helps you squeeze the highest possible octane number out of every ounce of TEL. And a gasoline testing arm which helps you measure and maintain the quality of your gasoline.

Our farm-program arm helped to develop an entirely new market for gasoline, and continually works to increase the size of this market.

Our statistical arm tabulates and delivers exclusive information on gasoline sales to help you analyze your own regular and premium sales.

And finally, Ethyl's automotive arm works constantly with manufacturers of auto, truck and bus engines to help them develop engines that will make more efficient use of your gasoline.

In short, we believe Ethyl is uniquely equipped to lend you a helping hand—and we're always happy to do so.

ETHYL CORPORATION, New York 17, N. Y.

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Every third Employee owns part of Standard

Meet Forrest Dickinson, a driller from Whittier, California—and one of the owners of Standard Oil Company of California. Forrest is bringing up three youngsters, buying a home, and is also building a family nest egg by investing in his Company through Standard's stock ownership plan. Forrest and other Standard Oilers who are 35 or older and have 5 years of service, may, if they wish, invest a portion of their pay in Standard shares. The Company assists by contributing a percentage of its net profit to the stock ownership plan. Thus, in addition to salary and employee benefits, Forrest shares Company earnings in two ways: through Standard's contributions to his stock purchases, and through dividends on stock. Nearly 95% of all eligible employees now participate in this plan. While several thousand previously had invested in Company shares on their own, 12,000 of a total 34,750 Standard Oilers are now shareholders. This means, of course, that better than one out of every three people who work for Standard also *own* Standard. That's why Standard Oilers work a little harder to serve you better—after all, it's *their* business, too.

There's No Such Thing as a "typical" Standard shareholder. More than 115,000 individuals and couples from all levels of life own Standard.

Small Businesses and large believe in us, too. Our records show that 1,889 firms own shares of Standard Oil Company of California stock.

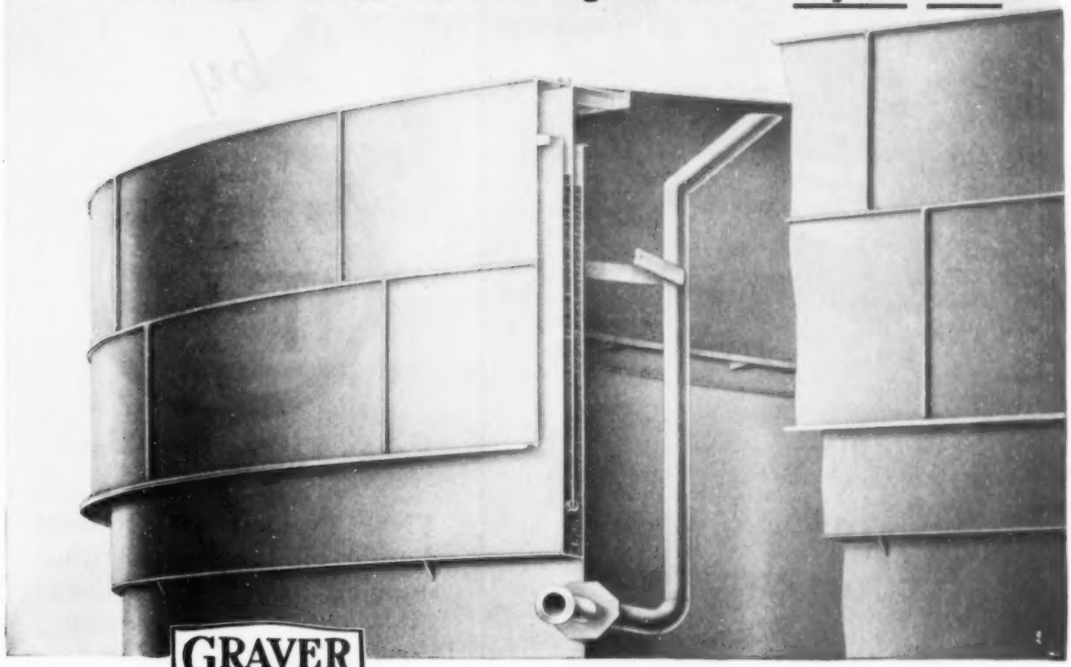
244 Churches and religious organizations, 165 hospitals and medical groups, and 293 universities and schools own part of Standard.

Standard's Owners are, mainly, thousands of average everyday people, most of them Westerners. Their Company's management is wholly independent. Standard Oil Company of California is neither owned nor controlled by any of the Standard companies in the East. *Questions or comments about our Company are always welcome. Write: Standard Oil Company of California, P. O. Box 3495-B, San Francisco, California.*

STANDARD OIL COMPANY OF CALIFORNIA ***plans ahead to serve you better***

ONLY THE GRAVER EXPANSION ROOF

...offers all the advantages of the liquid seal



Positive seal protects under all conditions
High operational efficiency shown over a decade

...Low maintenance equals that of cone roof tankage
Easy manifolding affords terminal-wide protection

...Accurate gauging obtained through vertical lift
Unique stabilizing device means trouble-free action

...Removable weather hood facilitates inspection
Simple installation converts existing tankage
Underwriters' Laboratories asserts Graver Expansion Roof conducive to reduction of fire hazards

Available upon request is a 16-page booklet describing in full the operation of this exclusive Graver design. Graver Expansion Roof tanks have been protecting volatile elements of gasoline at important installations since 1939.

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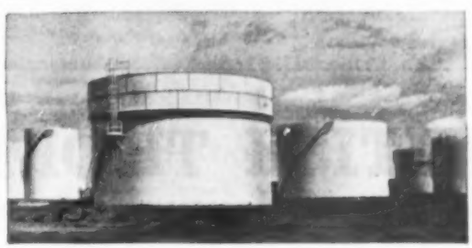
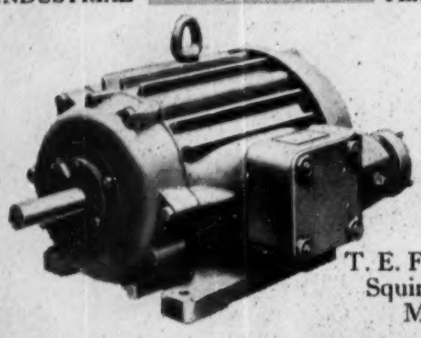


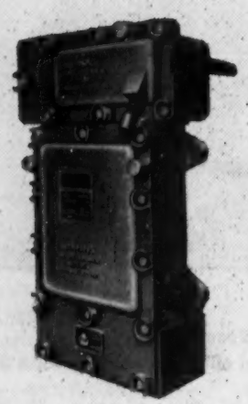
FLP Electric Equipment

INDUSTRIAL FLAMEPROOF

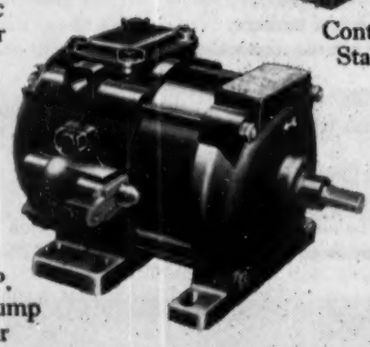


T. E. Fan-cooled Squirrel-cage Motor

Electro-hydraulic Thrustor



Contactor Starter



F.H.P. Petrol-pump Motor

by

B T-H

IN many industrial processes from oil refining to paint-spraying, flameproof electric equipment is essential. The BTH Trade Mark in association with the FLP symbol distinguishes a wide range of electric equipment of proved performance—Buxton-certified for service in atmospheres where inflammable vapours or gases may be present.

Products include motors, from petrol pump sizes up to 1,000 h.p.; a wide range of control gear; thrustors; switchgear; and lighting equipment.—

SPECIFY BTH

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BRITISH THOMSON-HOUSTON

COMPANY LIMITED, RUGBY, ENGLAND

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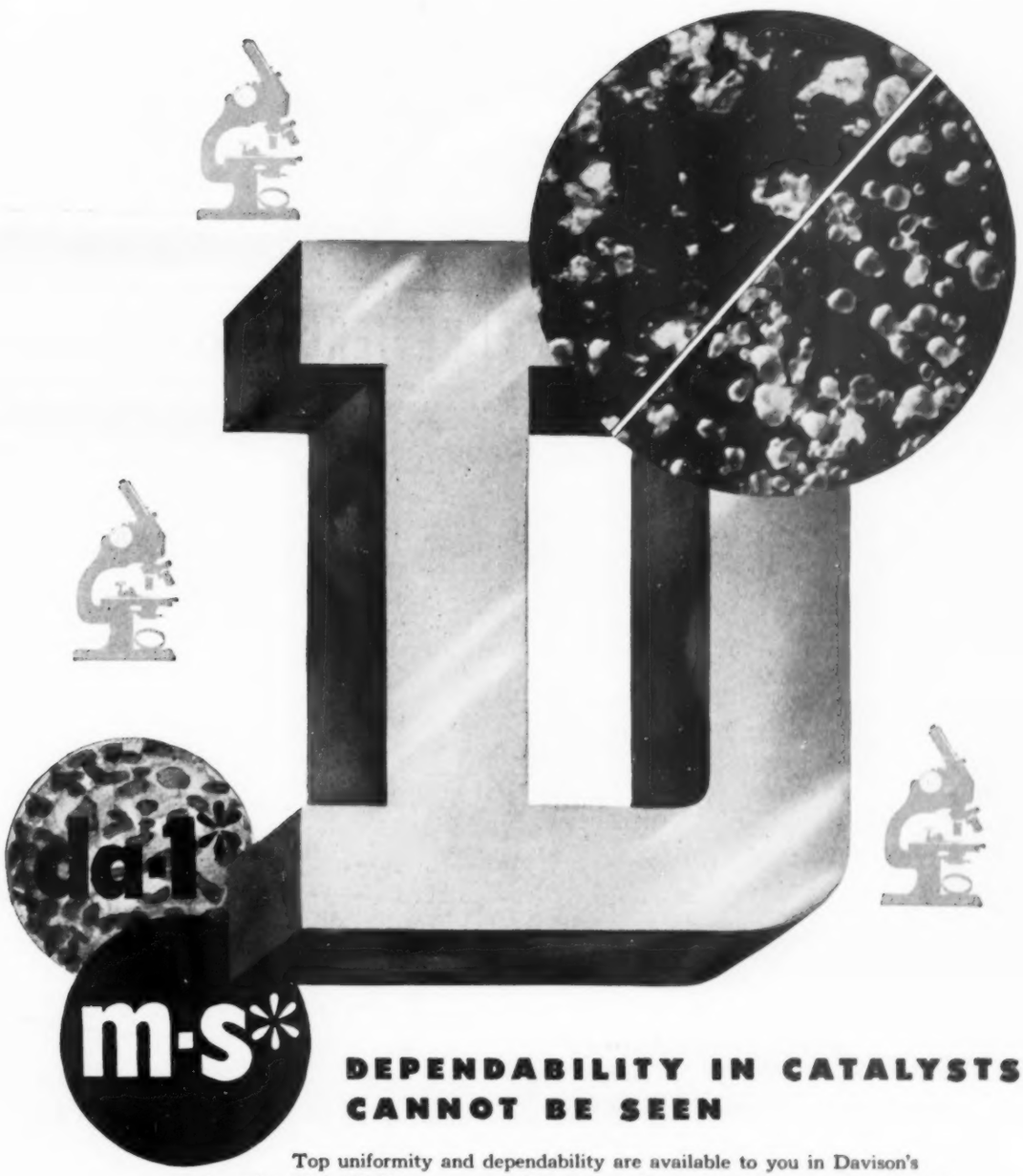

DEPENDABILITY IN CATALYSTS CANNOT BE SEEN

Top uniformity and dependability are available to you in Davison's microspheroidal (M-S*) or ground (DA-1*) synthetic fluid-type cracking catalysts. The accompanying photomicrographs show the physical characteristics of the DA-1 and new M-S catalysts produced in Davison's Cincinnati plant. Uniform physical and catalytic characteristics result from Davison's modern facilities and years of technical experience and research. Experienced Davison Field Service Engineers—complete laboratory facilities—are all part of Davison Dependability—Dependability with the big "D".

*T.M.T.D.C.C.

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Baltimore 3, Maryland

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Koninklijke Zwavelzuurfabrieken v/h

Ketjen N.V.

Amsterdam The Netherlands • Founded 1835

Our plant for the production of

KETJENCAT

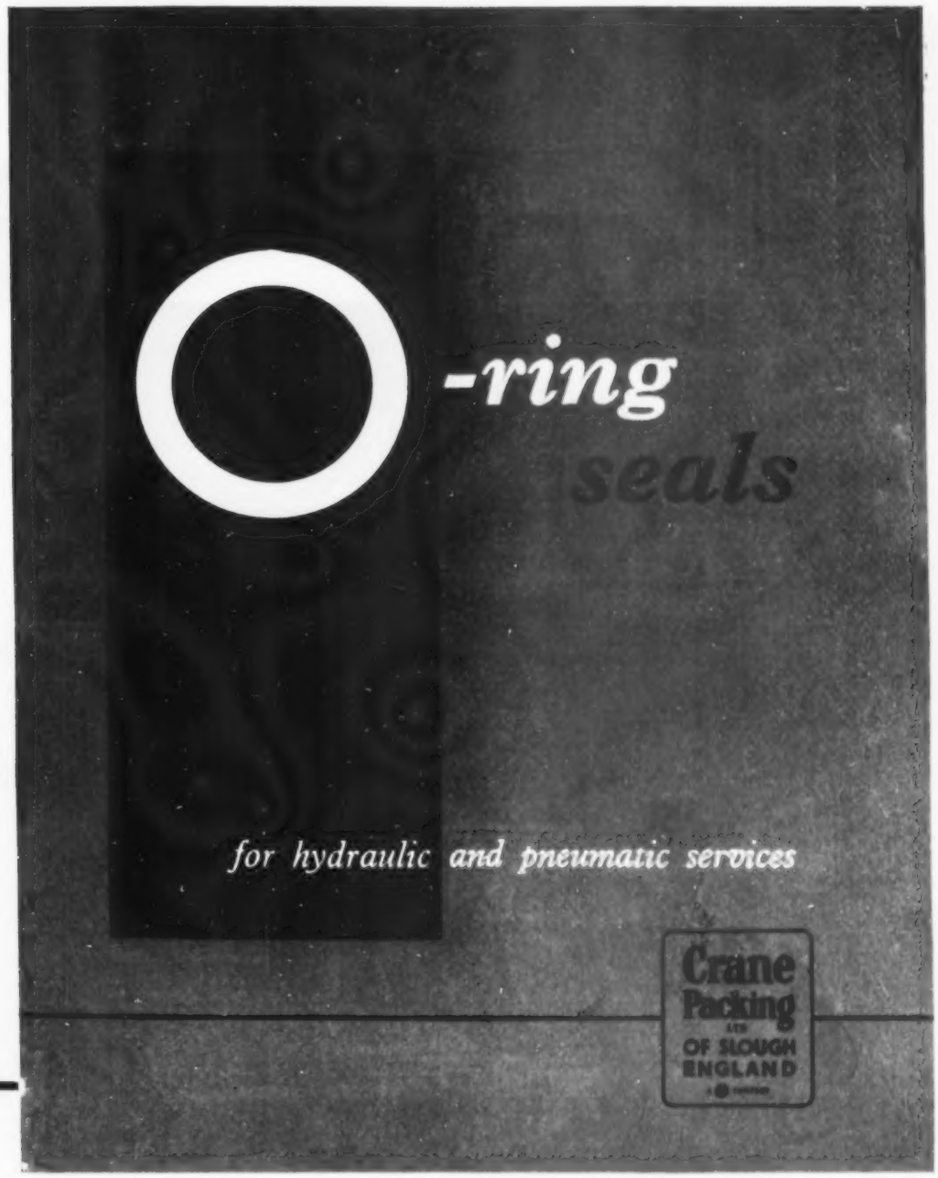
(M.S. Fluid cracking catalyst)

based on the processes of

AMERICAN CYANAMID COMPANY - New York

is now in full operation

PLANS FOR DOUBLING THE PLANT CAPACITY IN THE NEAR FUTURE ARE WELL IN HAND



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For some time we have been manufacturing O-Rings for innumerable applications using various materials according to the requirements imposed by the service conditions.

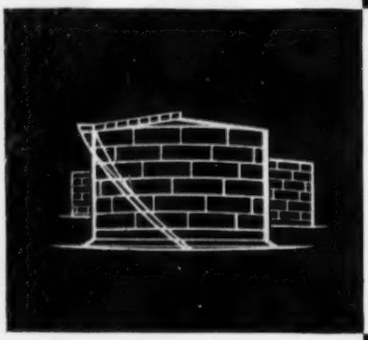
Now, having **proved** the product in service and having successfully developed methods of manufacturing in quantity without loss of quality or reliability we have published an authoritative booklet on the subject of O-Rings which should be of interest to all engineers and designers who are interested in the use of them.

A copy or copies of this booklet can be supplied at once to any interested firm or individual. Please send your name and address and, in the case of a Company, please let us know for whose attention it should be addressed.

CRANE PACKING LIMITED, SLOUGH, ENGLAND

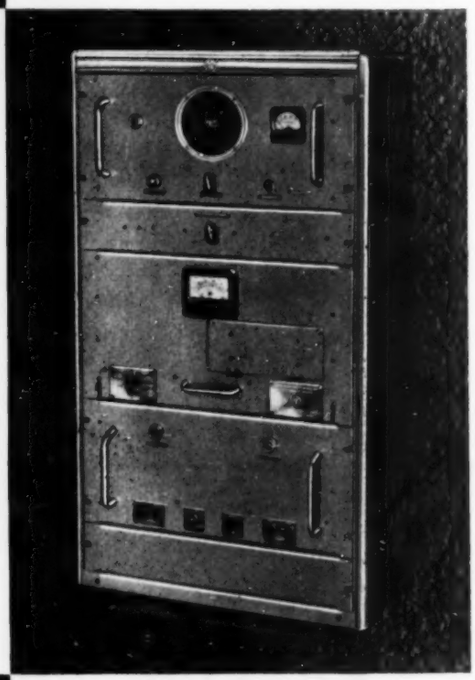
50 watt V.H.F. TRANSMITTER

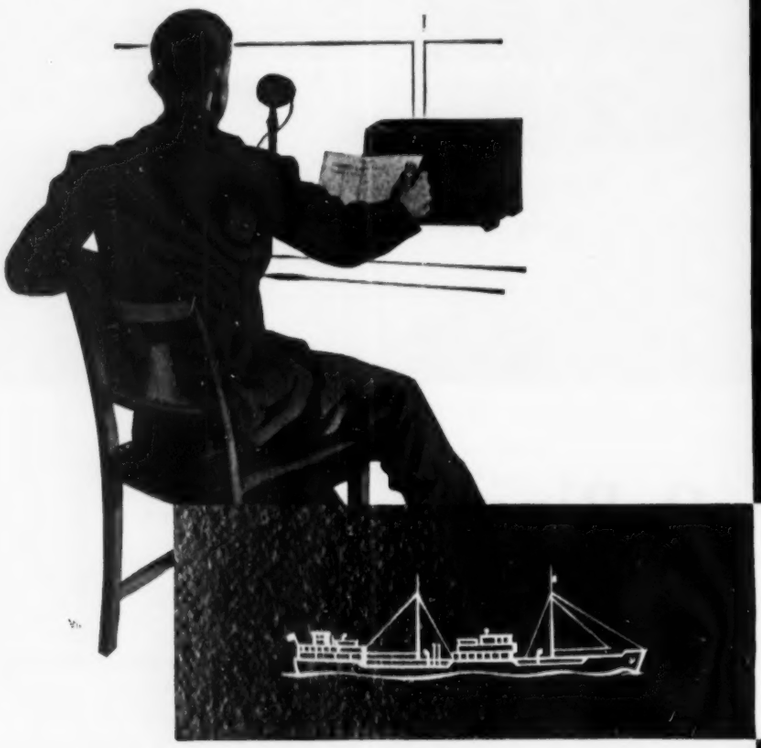
PTC 351 FOR OILFIELD COMMUNICATIONS



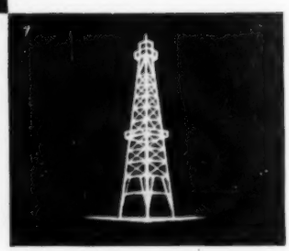
Of an advanced design using the latest techniques, the new Pye 50-watt V.H.F. Transmitter is ideal for use in normal fixed and mobile schemes where high powered transmitters are required. It may also be used for point-to-point radio-telephone links.

A further application is in the aeronautical band where the 50-watt transmitter, together with the standard Pye fixed receiver, provides one of the most efficient ground-to-air control stations at present available in the world.



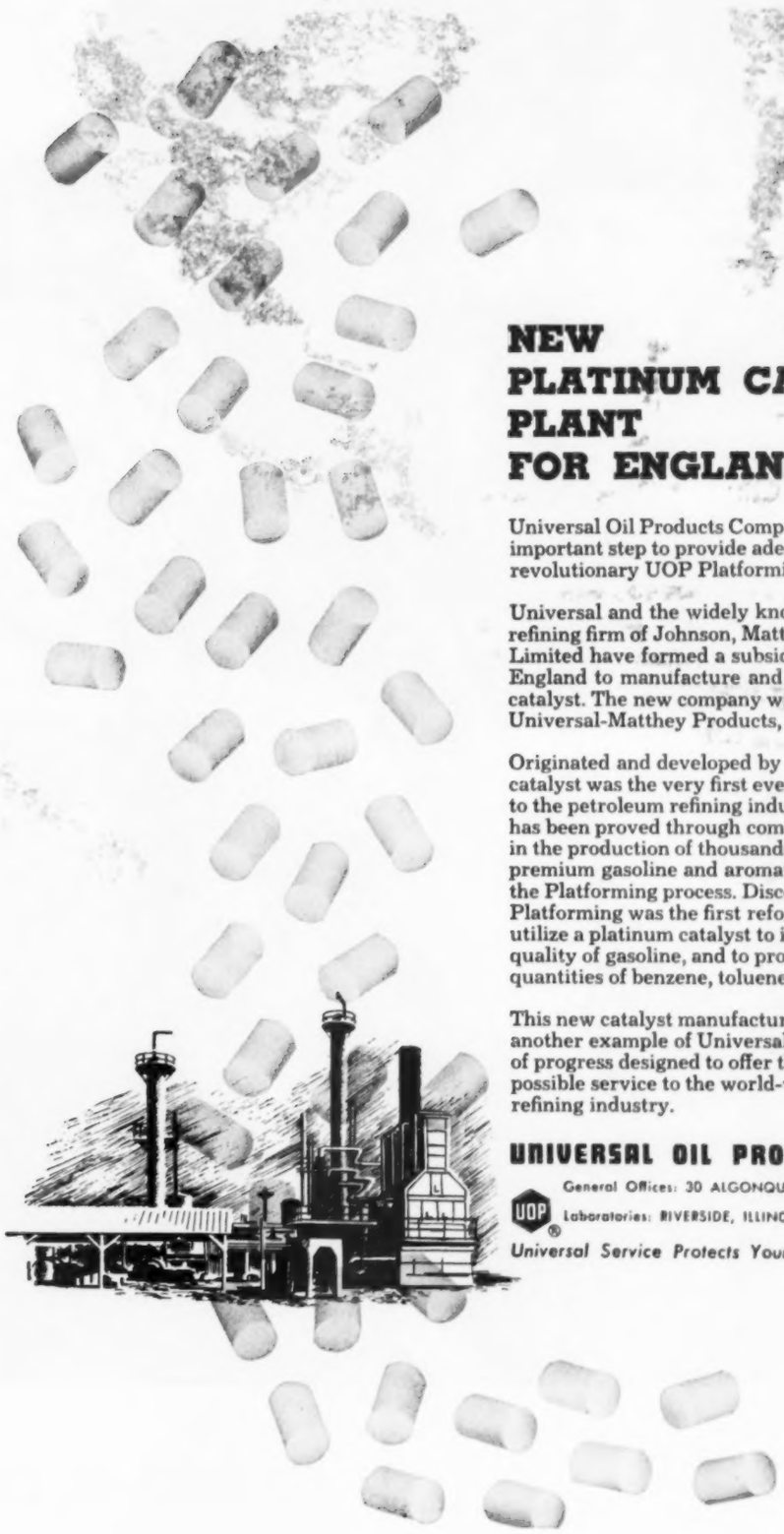


Telecommunications



PYE LIMITED • CAMBRIDGE • ENGLAND

3C/11



NEW PLATINUM CATALYST PLANT FOR ENGLAND

Universal Oil Products Company has taken an important step to provide adequate quantities of the revolutionary UOP Platforming catalyst in sterling.

Universal and the widely known platinum refining firm of Johnson, Matthey & Company, Limited have formed a subsidiary in England to manufacture and market platinum catalyst. The new company will be known as Universal-Matthey Products, Limited.

Originated and developed by Universal, this platinum catalyst was the very first ever to be offered to the petroleum refining industry. Its effectiveness has been proved through commercial operation in the production of thousands of barrels of both premium gasoline and aromatics from petroleum by the Platforming process. Discovered by Universal, Platforming was the first reforming process to utilize a platinum catalyst to improve the quality of gasoline, and to produce commercial quantities of benzene, toluene and xylenes.

This new catalyst manufacturing plant is but another example of Universal's continuing program of progress designed to offer the broadest possible service to the world-wide petroleum refining industry.

UNIVERSAL OIL PRODUCTS COMPANY

General Offices: 30 ALGONQUIN ROAD, DES PLAINES, ILL., U.S.A.

UOP®

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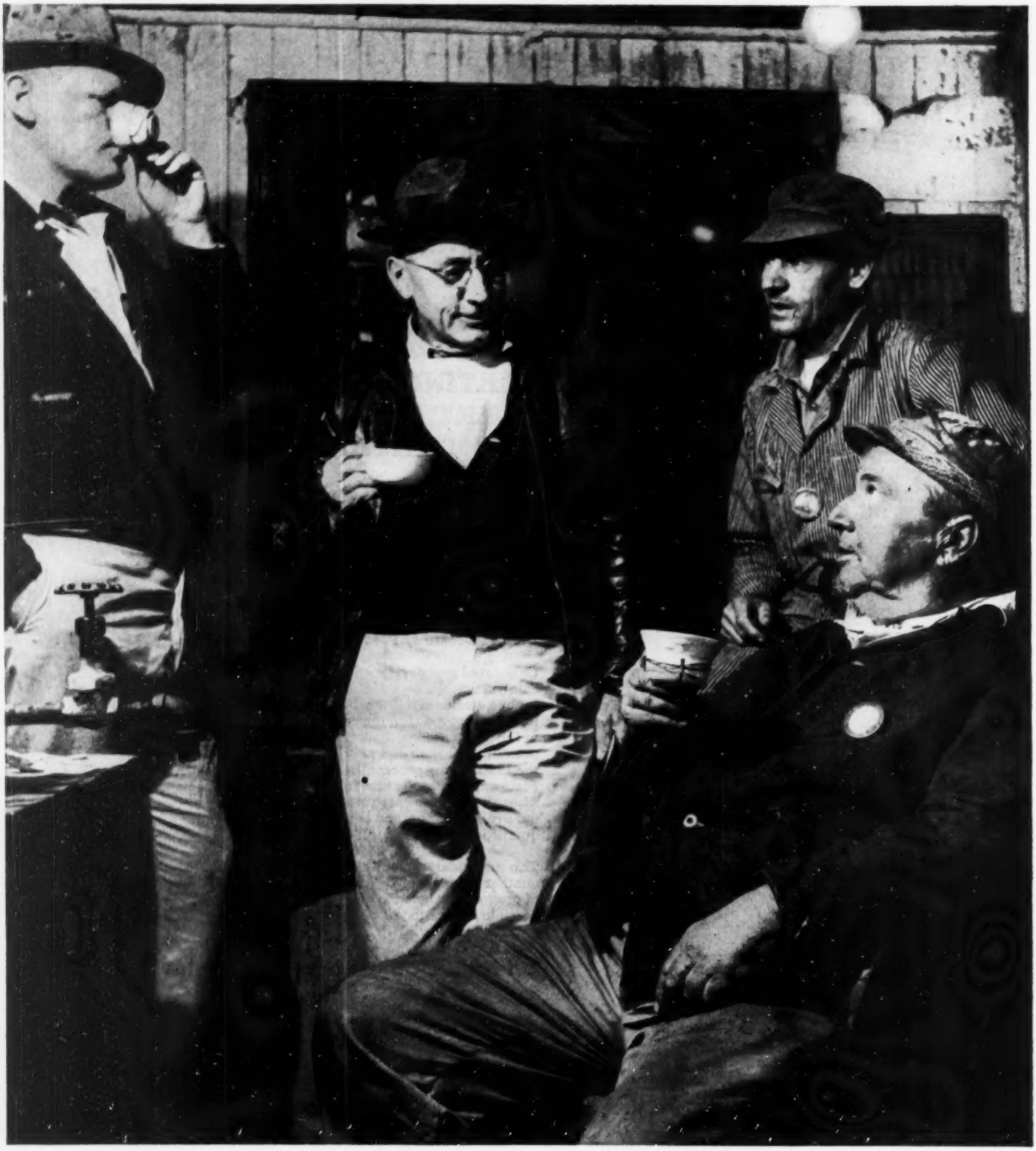
Universal Service Protects Your Investment



"The march up the steps of material progress depends not alone on the continued expansion of scientific knowledge and on industrial daring and managerial skill, but also on political and social conditions. The basic requirement for progress is freedom – freedom to inquire, to think, to communicate, to venture. Without these conditions, the human mind and spirit will be so shackled that the availability of natural resources will be limited and we may exhaust the known sources of some needed material and find nothing to replace it."

STANDARD OIL COMPANY (NEW JERSEY)

AND AFFILIATED COMPANIES

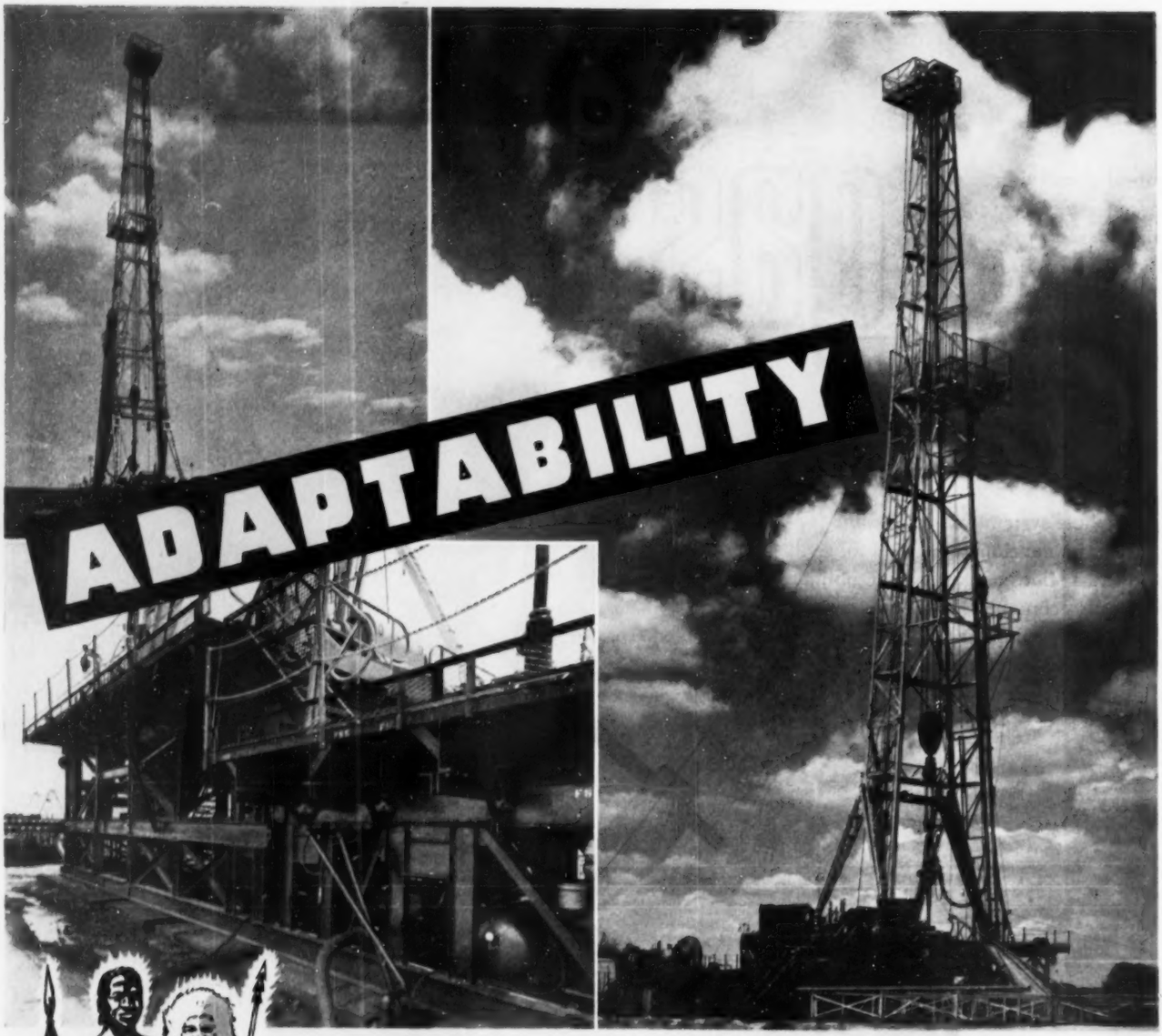
gas

The method of carrying gas long distances from generating plant or natural-gas reservoir to towns and factories is about as old as this century. Many nations now have extensive networks of overland pipe lines, supplying cheap and plentiful gas to homes and industries.

But this whole system was impossible until Mannesmann developed the steel tube. Today long-distance lines of elastic steel tubing make the gas supply economical and perfectly safe. Not only does Mannesmann supply the tubes, but highly trained Mannesmann welders guarantee the leak-proof perfection of Mannesmann-laid cross-country gas pipe lines.

Confidence—
the reward of decades

MANNES EXPORT DUSSELD



ADAPTABILITY

Lee C. Moore Masts are designed for use with standard or SPECIAL Equipment. Substructures are available in lengths to suit drawworks power used, and extensions are available to accommodate changes in power unit. Racking fingers can be furnished for any size drill pipe, and hinged racking platform floor allows extra room for additional pipe when needed. Lee C. Moore Masts are adaptable for every drilling rig. Sizes available for practically any drilling depth.

LEE C. Moore

Protected by patents and pending patent applications.

Our engineers are at your service for working out unusual rig arrangements or for special structure applications.

LEE C. MOORE CORPORATION TULSA • DALLAS • HOUSTON • MIDLAND • SHREVEPORT
WICHITA • CENTRALIA • PITTSBURGH • Export Office — Room 624, International Bldg., 630 Fifth Ave., New York 20, N. Y.

Wherever you are – your Worthington sales office is "just around the corner"

Whatever your business may be—manufacturing, transportation, agriculture, power, petroleum, road-building, construction, food, chemicals—the great variety of machines bearing the Worthington "wings" includes many units you require.

In addition to distributors all over the world, there are Worthington manufacturing plants in England, France, Italy, Spain, Germany, Austria, Mexico and Brazil.

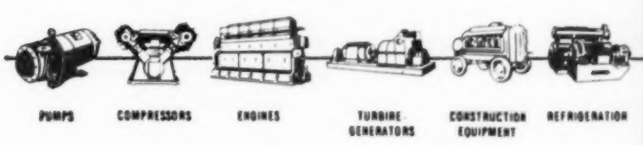
When you buy from Worthington, you have access to:

1. *One of the world's broadest lines of industrial machinery*—pumps, compressors, motors, turbines, engines, drives, air conditioning and refrigeration, and a complete line of construction equipment.

2. *An unequalled range of experience* gained in serving customers all over the world. Familiarity with actual conditions in every country.

3. *Worthington-trained local representatives* with extensive engineering experience, qualified to give technical recommendations.

Write for Worthington's new booklet, "World-Wide Operations". Worthington Corporation, Export Department, Harrison, N. J., U. S. A. F-3.26

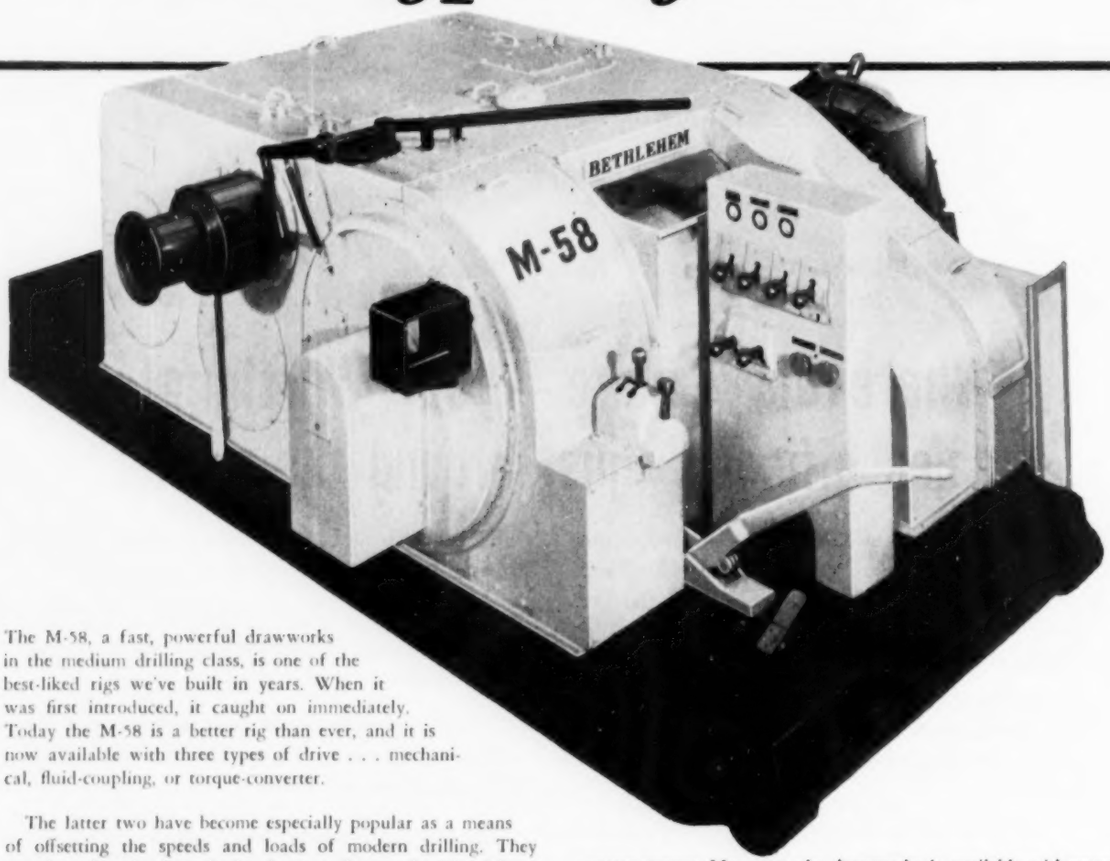


WORTHINGTON

The Sign of Value Around the World

Bethlehem M-58

Now Available with THREE *Types of Drive*



The M-58, a fast, powerful drawworks in the medium drilling class, is one of the best-liked rigs we've built in years. When it was first introduced, it caught on immediately. Today the M-58 is a better rig than ever, and it is now available with three types of drive . . . mechanical, fluid-coupling, or torque-converter.

The latter two have become especially popular as a means of offsetting the speeds and loads of modern drilling. They greatly reduce loading shocks that can shorten the life of bearings, chains and engines. All M-58's are smooth-running units, and an M-58 equipped with fluid drive is just about the smoothest rig you ever saw.

There are other things you'll like, too. For instance, the very high clutch capacity (59,000 ft-lb in the low-speed drum clutch). And the big, strong shafts with short bearing centers. And the extra-large, extra-powerful brakes cooled by enclosed circulating water system. Moreover, the drawworks is available with upper drum when desired.

The M-58 can be furnished with two- or three-engine drive and single or double pump drive. The engine compound is of sectionalized type so that the rig can be broken down into loads of required road width.

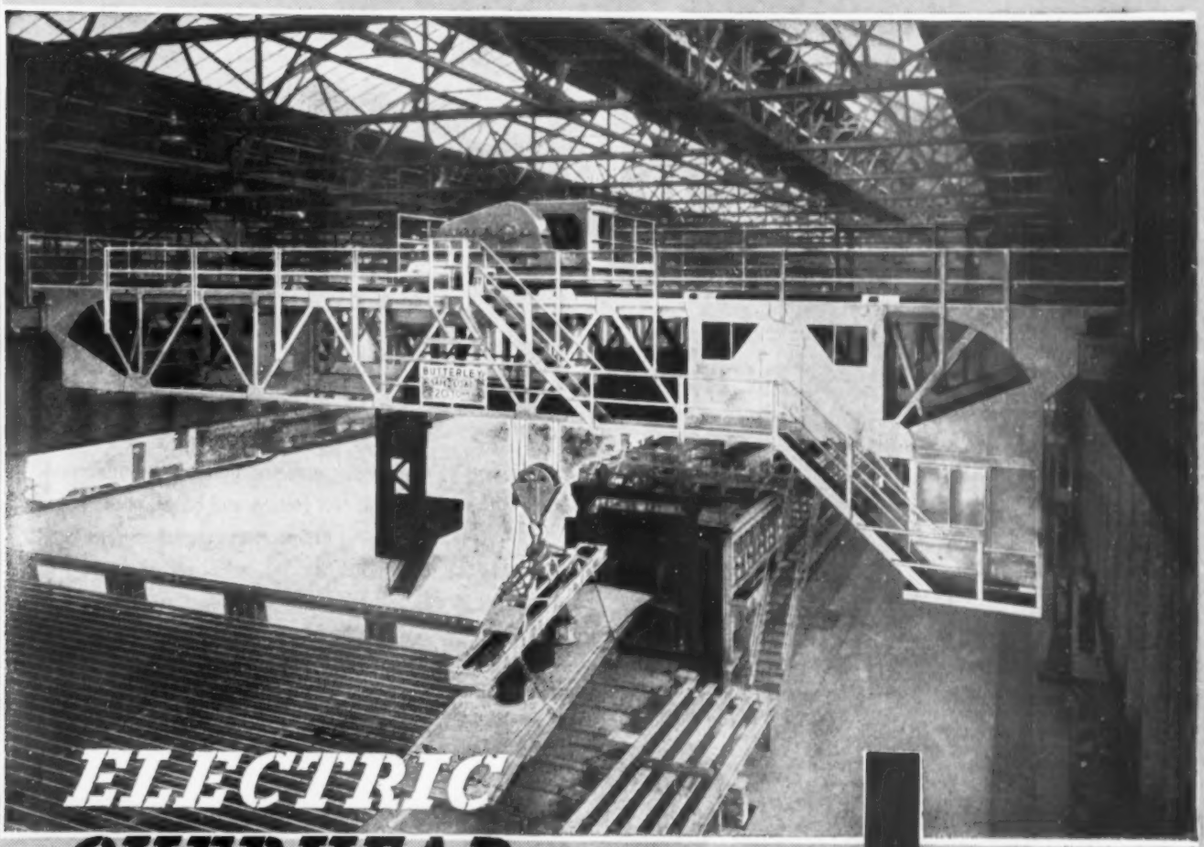
We suggest that you get all the facts about the M-58. Write us for information; complete details will be sent promptly.

In addition to a full line of drilling equipment, Bethlehem manufactures a wide range of pumping units for production work.

BETHLEHEM STEEL

BETHLEHEM STEEL EXPORT CORPORATION

25 Broadway, New York 4, N. Y., U. S. A. Cable Address: "BETHLEHEM, NEWYORK"



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Cranes for heavy duty, of rugged construction for steel mill service. Efficient and reliable, smooth and quiet running.

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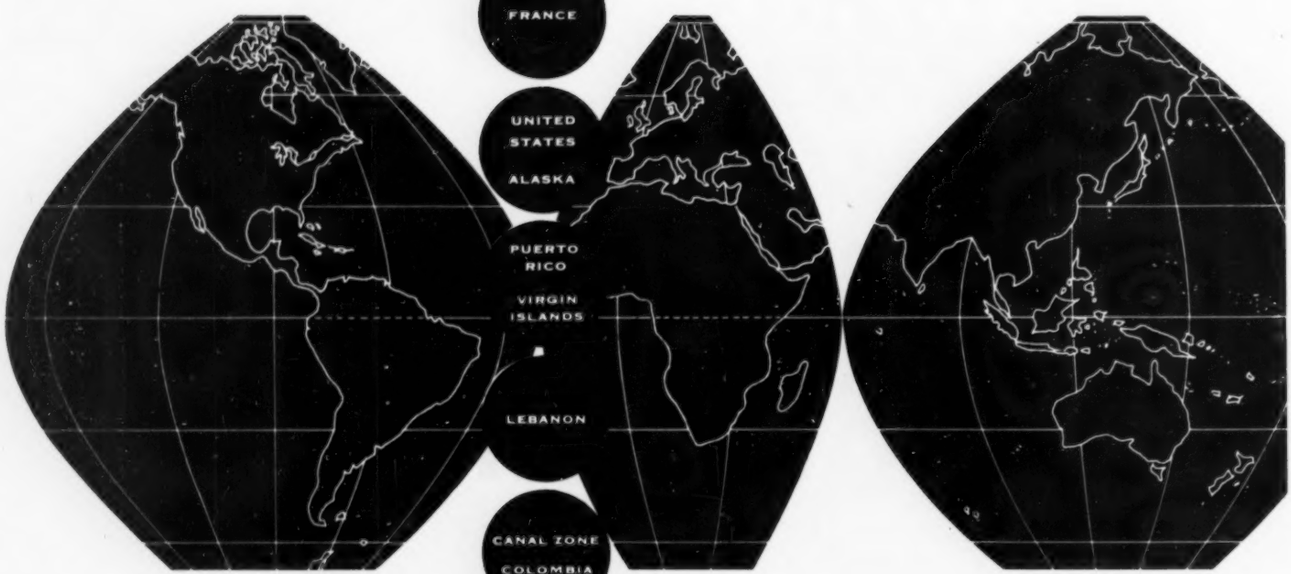
SINCE 1890

INTERNATIONAL SCOPE OF OPERATION

Fluor, an engineering, construction and manufacturing firm with international recognition and 63 years of experience, serves the petroleum, gas, chemical, power and heavy industries the world over. Fluor is currently engaged in many diversified projects in the regions listed below, and thousands of the products manufactured by Fluor are to be found in most of the free countries of the globe.



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Mobilgas Milestones

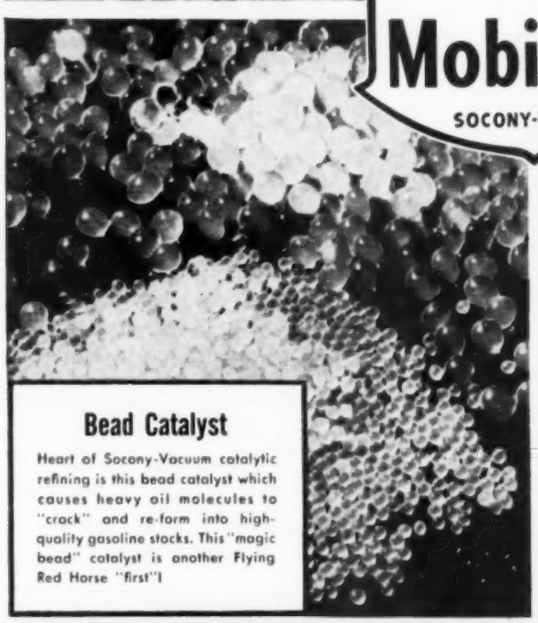
Catalytic Cracking

Secret of today's improved car engine design and performance is the super-high-power gasoline ingredients made available through catalytic cracking. Socony-Vacuum built the first commercial "cat cracker" in 1936!

TCC Refining

In 1943 the first commercial Thermofor Catalytic Cracking unit — using a continuous catalytic process — went into production. Created by Flying Red Horse research, this TCC process made possible greater quantities of high octane stocks and even better gasolines!

Mobilgas
SOCONY-VACUUM



Bead Catalyst

Heart of Socony-Vacuum catalytic refining is this bead catalyst which causes heavy oil molecules to "crack" and re-form into high-quality gasoline stocks. This "magic bead" catalyst is another Flying Red Horse "first"!

New Reforming Process

TCR — Thermal Catalytic Reforming Process — latest in catalytic processing — produces highest-quality blending stocks from low-quality material . . . assuring continued Flying Red Horse leadership!

SOCONY-VACUUM OIL COMPANY, INC.
and Affiliates
MAGNOLIA PETROLEUM COMPANY · GENERAL PETROLEUM CORPORATION

SOCONY-VACUUM

The Greatest Gasoline Development in 31 Years

TCP*, a Shell discovered additive now blended into Shell Premium Gasoline, sets the pace for the fuels of tomorrow. It's another milestone in Shell's petroleum research.

The long-recognized problem of power loss due to combustion by-products has been solved by Shell research. No longer need these by-products cause the waste of fuel and power associated with missing spark plugs and with pre-ignition.

Shell research has discovered and developed a fuel additive now in Shell Premium Gasoline—called TCP. This additive actually changes the character of harmful deposits *within the engine* so that faulty spark plug operation and pre-ignition are eliminated promptly—often during the second tankful. Old *and* new engines benefit alike.

Shell TCP additive was originally developed for aviation fuels. Up until now it has been restricted to military planes. Without question it is the greatest fuel development since the introduction of tetraethyl lead in 1922.

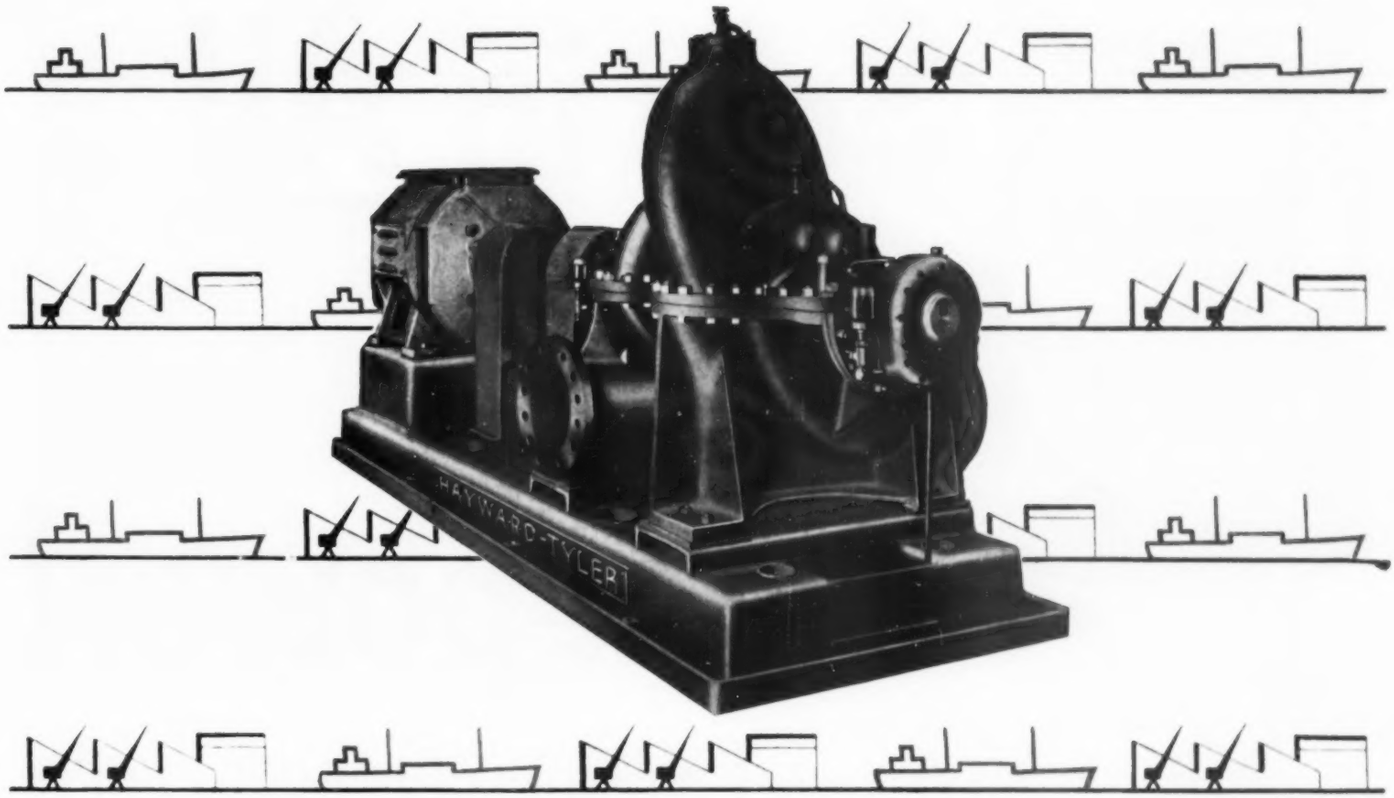
Important as TCP additive is for cars today, perhaps the greatest significance is its great promise for the future. TCP additive points the way to lighter, more powerful engines—engines with much greater design efficiency than has heretofore been possible.

TCP, Shell's trademark for its remarkable additive, is another example of the progressive research that goes forward day and night in Shell laboratories. It is evidence again that Shell research provides more and better products from petroleum.

*Patent applied for

SHELL OIL COMPANY

SHELL



BUNKERING PUMPS

Wherever oil has to be handled in quantity the Hayward Tyler Centrifugal Bunkering Pump is the modern answer. This is a two-stage pump, with horizontally split casing, designed for long life and easy servicing.

The capacities of the present range are as follows:—

Size	Capacity (tons water per hour)	Pressure (lbs. sq. in.)	R.P.M.
8" x 10" x 16"	575	140	1,750
10" x 12" x 16"	830	140	1,750
12" x 14" x 16"	1000	140	1,600

The materials for the standard pump are high tensile cast iron with bronze fittings and steel shaft with stainless steel sleeves. Other materials are available according to requirements. May we send you further details?

HAYWARD TYLER

& CO., LTD.

LUTON, BEDFORDSHIRE, ENGLAND

TELEPHONE LUTON 3951

LONDON OFFICE : 20 GROSVENOR PLACE, WESTMINSTER, S.W.1. TEL : SLOANE 7552

Seal in All Your Horsepower!

with the Veedol Motor Oil

"Film of Protection"

You bought a lot of horsepower when you got that modern car.

Now you can *seal in* all that power . . . with the famous VEEDOL "Film of Protection."

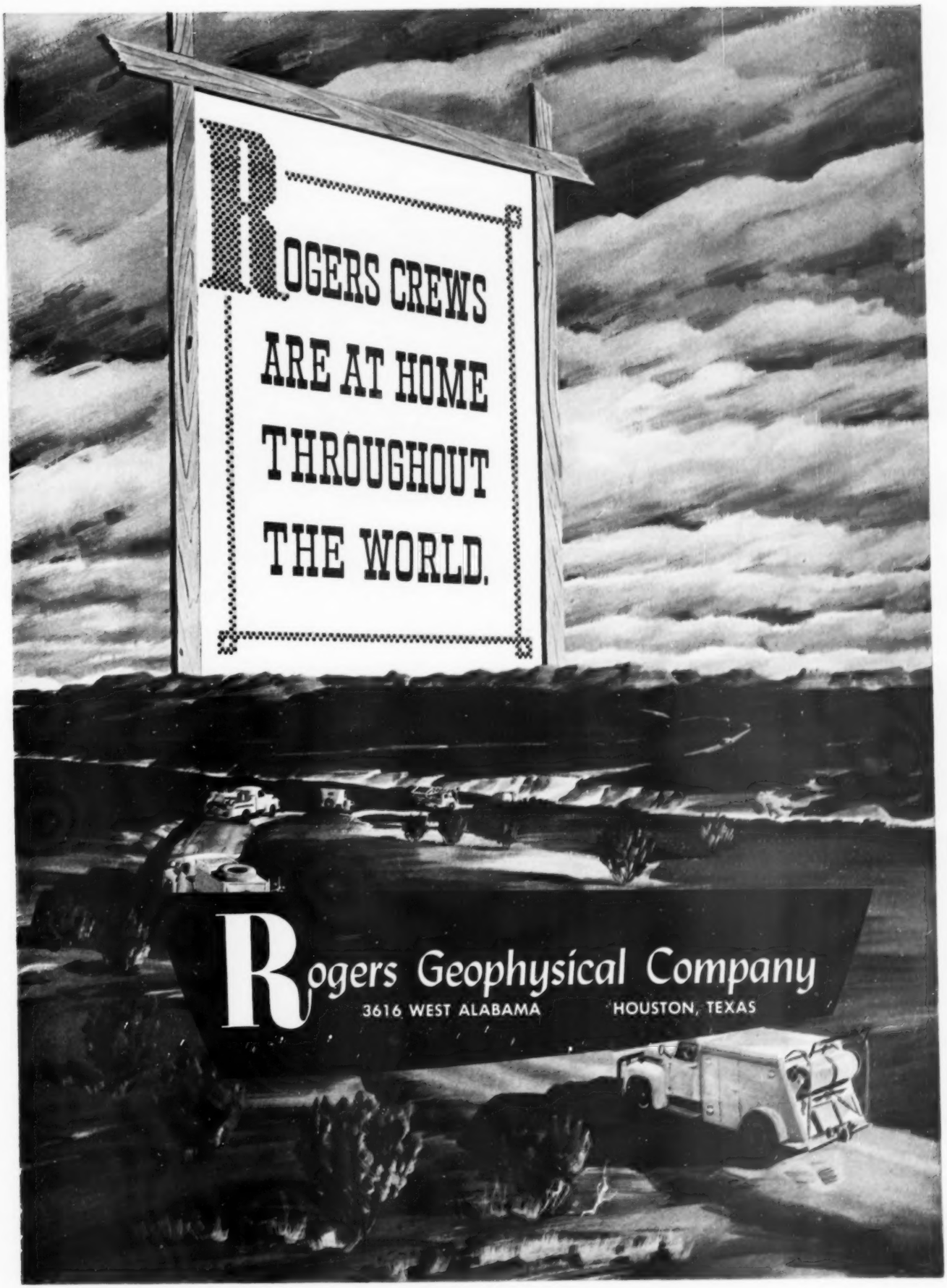
VEEDOL Motor Oil *seals in* horsepower by resisting blow-by! It contains detergent additives that suspend contaminants, leaving your engine cleaner after draining. And it combats the metal-eating action of "engine sweat" by forming the famous anti-corrosion "Film of Protection" on metal surfaces.

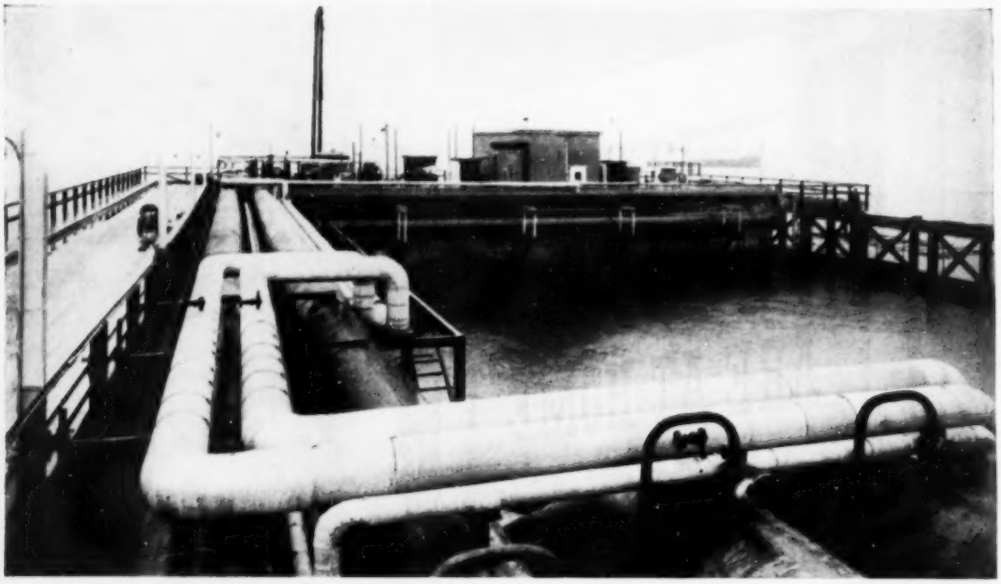
Use all the horsepower you bought! Get all the power your car can deliver. Drain and refill your crankcase with fresh VEEDOL Motor Oil.

TYDOL

TIDE WATER ASSOCIATED OIL COMPANY
New York Tulsa San Francisco

FEDERAL
Federal Flying -A- Tires . .
Good for a long safe ride!


ROGERS CREWS
ARE AT HOME
THROUGHOUT
THE WORLD.
Rogers Geophysical Company
3616 WEST ALABAMA
HOUSTON, TEXAS



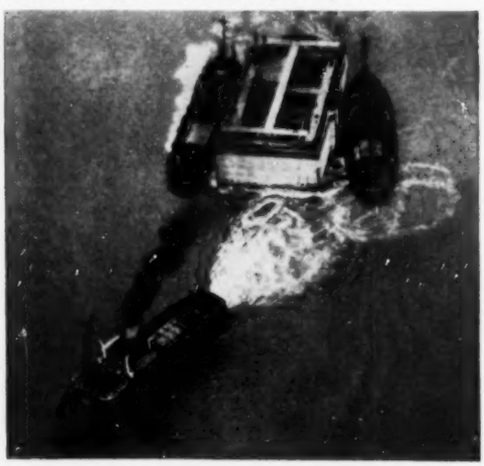
The completed water intake chamber and jetty

The partially constructed unit leaving Gravesend

Construction of Water Intake Chamber for Coryton Oil Refinery

This 4,200-ton reinforced concrete caisson forms an important part of the plant cooling system for Vacuum Oil Company's new refinery at Coryton. The caisson was constructed on the Mulberry Harbour principle at Gravesend and Tilbury and floated to Coryton.

Under tow for eight miles from Tilbury to Coryton



Contractors for
Civil Engineering and Building work
at the Coryton Refinery for
Vacuum Oil Company Limited

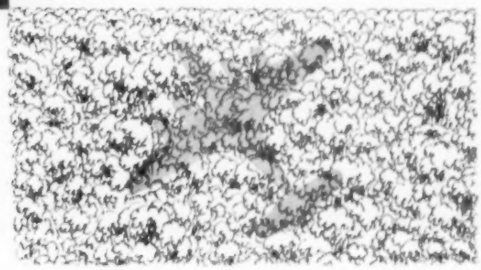
LAING

JOHN LAING AND SON LIMITED · LONDON, CARLISLE, JOHANNESBURG, LUSAKA · ESTABLISHED IN 1848

STANDARD-VACUUM

When night steals over the paddy fields of Java, kerosene burns in the farmers' lamps to drive the darkness away • When an airliner sets down in Bangkok, hundreds of gallons of high octane aviation fuel pour into the tanks which feed its powerful motors • A road reaches into the back country of Luzon; asphalt from oil gives it a hard, smooth surface • And when a tramp steamer sails from Mombasa, bunker oil may turn the screws as they churn the waters of the Indian Ocean.

From Tokyo to Karachi; from the minerally rich highlands of Southern Africa to the coastal cities of Australia and New Zealand, the varied petroleum products of Standard-Vacuum weave in some way through the whole pattern of living.



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Height 120 ft. **Diameter 6 ft.**

Built for Fraser & Chalmers Engineering Works (Proprietors: The General Electric Co. Ltd.) Erith, Kent.

During the last 40 years Tileman's have designed and constructed re-inforced concrete chimneys for every kind of industrial undertaking. Up to date they have built nearly 200 chimneys, in countries as far apart as England and Australia, ranging up to a height of 480 feet in that constructed at Oran in 1950.

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500 Crew Years

OF SEISMIC EXPERIENCE!

says — PROFESSOR Doodlebug, S.S.C.

Seismograph Service Corporation has reached a milestone in its 22nd year of operation; a mark of distinction to the corporation and of significance to its clients.

Combining the years of experience accrued to the corporation and its subsidiaries, SSC records its 500th Crew-Year of geophysical experience.

With these combined years as a foundation and guide for its operations and interpretations, SSC offers its clients ever more accurate surveys – thereby reducing the "chance" element of oil prospecting.

SSC is proud of this achievement.

SSC

World-wide Experience

Seismograph Service Corporation

Seismic Surveys – Gravity Surveys – Pilot Crews – Lorac

TULSA 1, OKLAHOMA, U.S.A.

It takes a Giant to catch a Giant

IT'S always exciting to watch a little guy challenge a big guy—and win.

That's why Jack the Giant Killer has topped the list of popular children's stories for centuries. And that's why we think the oil business is the most thrilling business in the world. It's a contest between Men and a modern Colossus.

Not just any men. It takes men of tremendous initiative and daring—giants in their own right—to stalk the reluctant giant, Petroleum, drag him from his lair, civilize him, and put him to work.

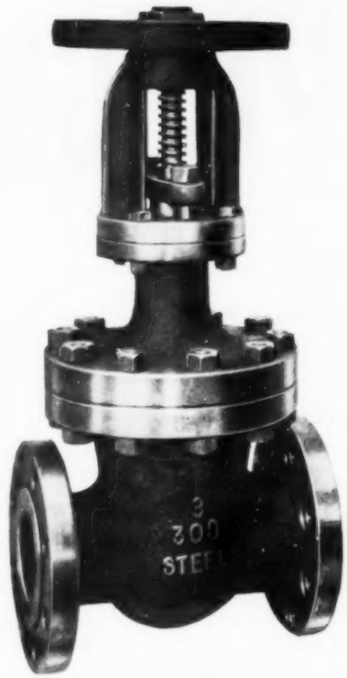
Cities Service is well equipped with such men. Geologists who, at great personal hardship, track down the giant in his native haunts. Production men who risk all to bring him out alive. Refinery operations men, who domesticate and train him. Research men, who think of new ways to utilize his strength.

The mammoth muscles of petroleum have taken over some of mankind's hardest, most back-breaking jobs. We think a lot of credit is due the great-hearted Cities Service "Jacks" who've devoted their lives to finding, catching and domesticating this mightiest of modern "Giants."

CITIES SERVICE

Quality Petroleum Products

Valves and Fittings for the Oil and Allied Industries



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WE ARE SPECIALISTS IN THE MANUFACTURE OF:—

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All Types of Oil Valves and Fittings for:—

CRACKING PLANT STORAGE TANKS
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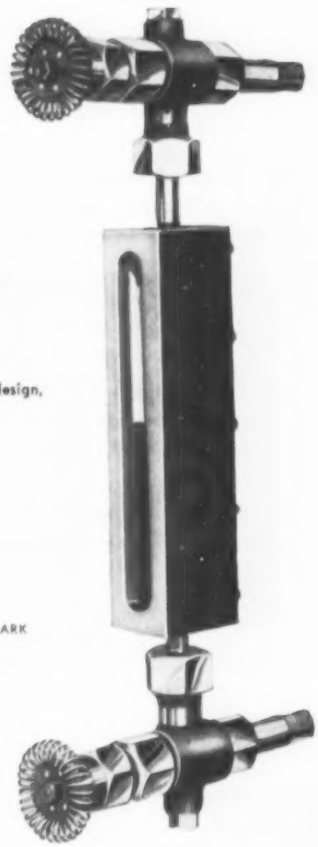
Write now for our BOOKLET SH/Z/A for full details of design, dimensions and specifications.



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FLOATING ROOF DESIGN?

Here are the Floating Roof Specifications which 30 years' experience has shown are necessary for best performance.

1. **Well designed, close fitting Seals; including Primary, Secondary, and Top Seals for maximum conservation.**
2. **Pontoons divided into large number of GAS-TIGHT compartments for safety.**
3. **Pontoon compartments Deep and Roomy so they may be easily entered and inspected for maintenance if necessary.**
4. **Pontoon compartments uncluttered with framework for easy inspection and maintenance.**
5. **COMPLETE CLEAN Drainage.**
6. **Roof designed to take ALL LOADS to which the structure may be subjected, with better than normal safety factor.**
7. **Pontoons designed to maintain buoyancy under all anticipated conditions.**
8. **Assure full use of the capacity of the tank for in and out storage.**

These specifications are met in every respect by the Wiggins Floating Roof and ONLY the Wiggins Floating Roof

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DU PONT

PETROLEUM CHEMICALS DIVISION NEWS

DU PONT

September ★ *One of a Series of Interest to the Petroleum Industry* ★ *1953*

100th ANNIVERSARY of Petroleum Research

The world's first scientific examination of crude oil was conducted by Dr. Crosby at Dartmouth College in 1853. The 100th Anniversary of this event was recently observed at Dr. Crosby's home, which also served as his laboratory.

Today, this event has far greater significance to the world than could possibly have been attached to it a century ago. From the first kerosine lamp to our modern synthetic fibers made from petroleum . . . from the first raucous chugging of the "horseless carriage" to jet airplanes that exceed the speed of sound—petroleum research has been a driving force in advancing our civilization.

Petroleum research itself has grown and progressed, too . . . from one man in a home laboratory to thousands of highly trained specialists in hundreds of modern oil and chemical industry laboratories. In the Du Pont Company alone—which makes many of its products out of petrochemicals and supplies the industry with petroleum additives—there are hundreds of specialists doing petroleum research work exclusively.

Mid-Continent District Manager

ROBERT M. GLOVER came to Du Pont from The Humble Oil Company in 1947. He was assigned to the Petroleum Chemicals Division's Mid-Continent District as a sales-service representative. In 1952 he became manager of this district.

ROBERT M. GLOVER

His experience in oil refining began in the Humble Oil Company's refinery at Baytown, Texas. There he did both field and research laboratory work. In the laboratory, he worked on solvent extraction of lubricating oils and the refining of petroleum waxes.

In 1940 he was transferred to Humble's products inspection laboratory where he directed the testing and loading of finished petroleum products into tankers, barges and tank cars.

Enlisting in the Navy in 1941, Glover was assigned to the office of the Inspector of Naval Materiel. There he supervised the acceptance of petroleum products bought by the U.S. Navy. After his discharge from the Navy in 1946, he returned to the Humble Oil Company as a product inspector.

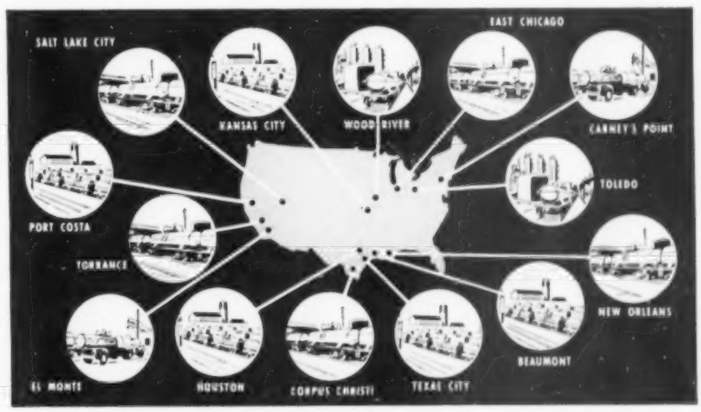
Mr. Glover received a B.S. degree in chemical engineering from Rice Institute and completed an additional year of graduate study at Massachusetts Institute of Technology.

You can count on Du Pont's 14 TEL STORAGE AREAS to Serve You in any Emergency

Strategically located rail sidings and truck facilities mean that "rush" TEL shipments can reach you in a matter of HOURS

You can now be assured of an ample supply of tetraethyl lead to meet any emergency, at any time.

To make this possible, Du Pont's Petroleum Chemicals Division maintains 14 rail sidings and tank truck terminals conveniently located adjacent to the major refining areas. And they are kept fully stocked with loaded TEL tank cars . . . ready to roll to any refinery at a moment's notice.



LOCATED *near all the major refining areas, these 14 Du Pont shipping points are prepared to fill orders for TEL at any time of the day or night.*

IN CASE OF EMERGENCY . . .

This extensive Du Pont distribution network was set up to help refiners meet emergency requirements for TEL which might not have been anticipated in regular delivery schedules . . . or to replace shipments which might have been held up by floods, train wrecks, strikes or other unforeseen circumstances.

NATIONWIDE SET-UP

Rapid delivery facilities are located at the following strategic points: Port Costa (San Francisco),

OVER

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

CONTINUED

Rapid Deliveries

Torrance and El Monte, California; Houston, Corpus Christi, Texas City and Beaumont, Texas; Salt Lake City, Utah; Kansas City, Missouri; Wood River, Illinois; East Chicago, Indiana; Toledo, Ohio; New Orleans, Louisiana; and Carney's Point, New Jersey.

The tank truck terminals at Carney's Point, N. J. and El Monte, Calif. are complete with weigh tanks and storage facilities. These make it possible for refiners to receive rush shipments of TEL in smaller-than-tank car lots.

FULLY LOADED, this TEL tank car is ready to roll to a refinery from a nearby siding on a moment's notice.

'ROUND-THE-CLOCK SERVICE

An ample supply of both Motor Mix and Aviation Mix is always on hand at all 14 shipping points. And there is someone at the phone to expedite your order at any time of the day or night. What's more, the chances are that your rush orders can be filled in a matter of a few hours—depending on the distance to your refinery.

FULLY STOCKED WAREHOUSES

In addition to the mobile units handling tetraethyl lead, Du Pont also maintains three fully-stocked warehouses in Houston, Los Angeles and Wilmington, Delaware, which carry a large supply of all other Du Pont petroleum additives.

FOR CONVENIENCE, smaller-than-tank car shipments of TEL can be sped to refineries by tank truck from El Monte, California and Carney's Point, New Jersey.

Field Tests Show Effectiveness of Du Pont Fuel Oil Additive No. 2

The following test, conducted by a major oil company, shows how you can reduce filter screen clogging in domestic oil burners with the new Du Pont Fuel Oil Additive No. 2.

The test was conducted under actual operating conditions during the 1951-52 heating season. The fuel used was of uncertain age and had been transported by tanker to a water terminal before the Fuel Oil Additive No. 2 was added. The fuel itself was a blend of cat-cracked and straight-run stocks having the following properties: 0.21% S; 326° F. – I.B.P.; 598° F. – 90%; 654° F. – E.P.

Approximately 70,000 barrels of this fuel were treated at a concentration of 30 pounds per 1,000 barrels during the loading of barges from shore tanks at the water terminal. The treated fuel was then delivered to another water terminal storage tank – from which it was supplied to all of the customers served by this terminal.

None of the customer burner units used in the test were given any special cleaning or reconditioning beyond the normal routine servicing. The test was continued throughout the heating season.

For a control, a similar marketing area was supplied with the same fuel—without the addition of Fuel Oil Additive No. 2.

Typical results of this test are shown in the above photograph. This shows filters used in a commercial burner consuming about 1800 gallons per month. Prior to the start of the test, this burner had required filter replacement each month. But when Du Pont Fuel Oil Additive No. 2 was added to the fuel, the filter was unusually clean and serviceable after a 10,800 gallon thruput.

LITERATURE AVAILABLE

Here is a partial listing of the bulletins, reports, booklets, movies and aids available to you through any Du Pont Petroleum Chemicals Division district office:

The Service Station and the Motorist – Report Nos. 1, 2 and 3 are now ready for distribution. Authoritative studies on gasoline buying habits in regard to service station loyalty, brand name loyalty and gasoline grade selection ..... Serials A-5396, A-5347 and A-5826

Du Pont Fuel Oil Additive No. 2—A 12-page bulletin describing this ashless stabilizer and dispersant which prevents clogging of fuel oil screens Serial A-5201

Pipeline on Wheels—A 26-minute, full-color movie on tank truck safety. Suitable for both training and public relations purposes.

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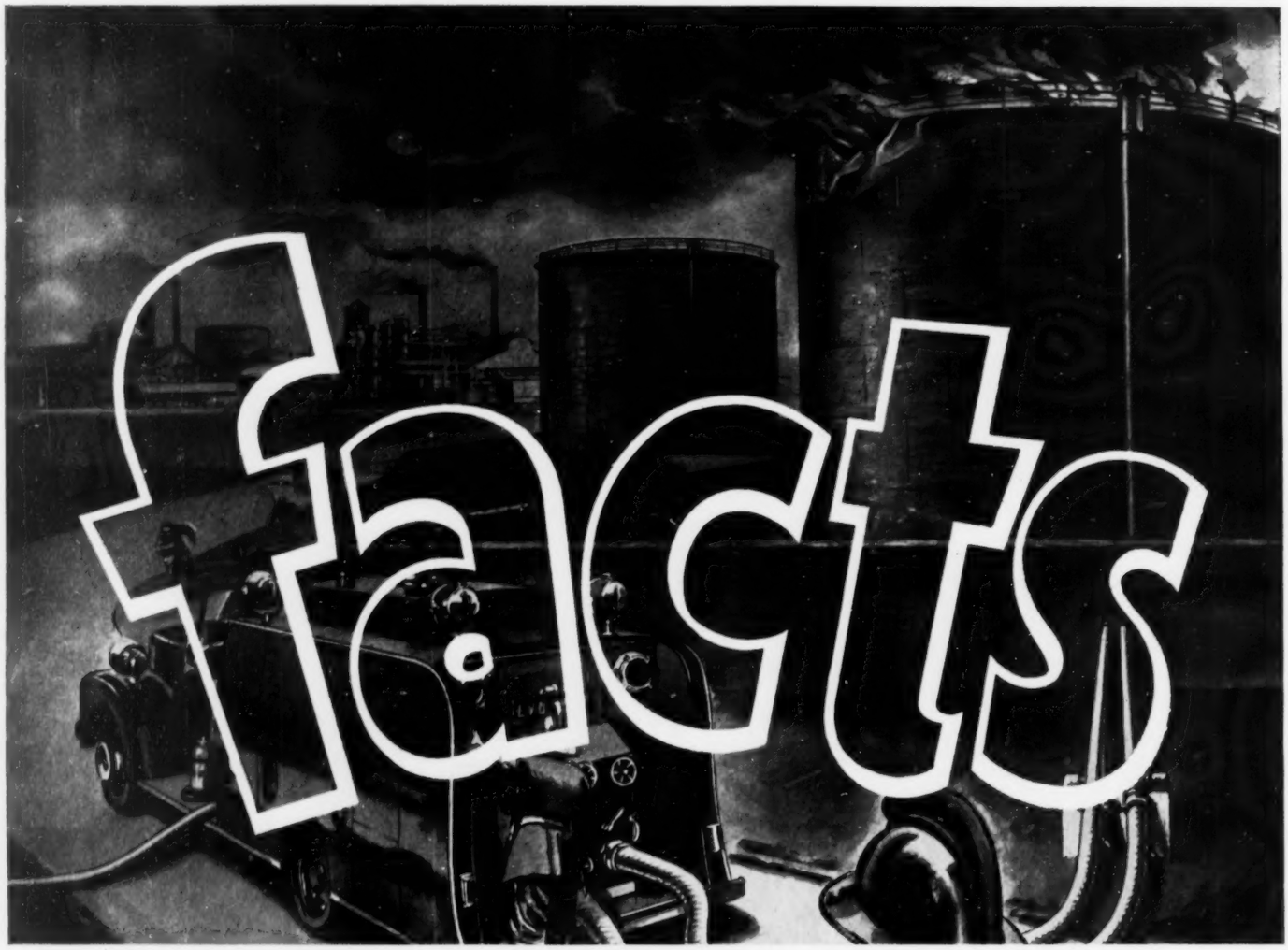

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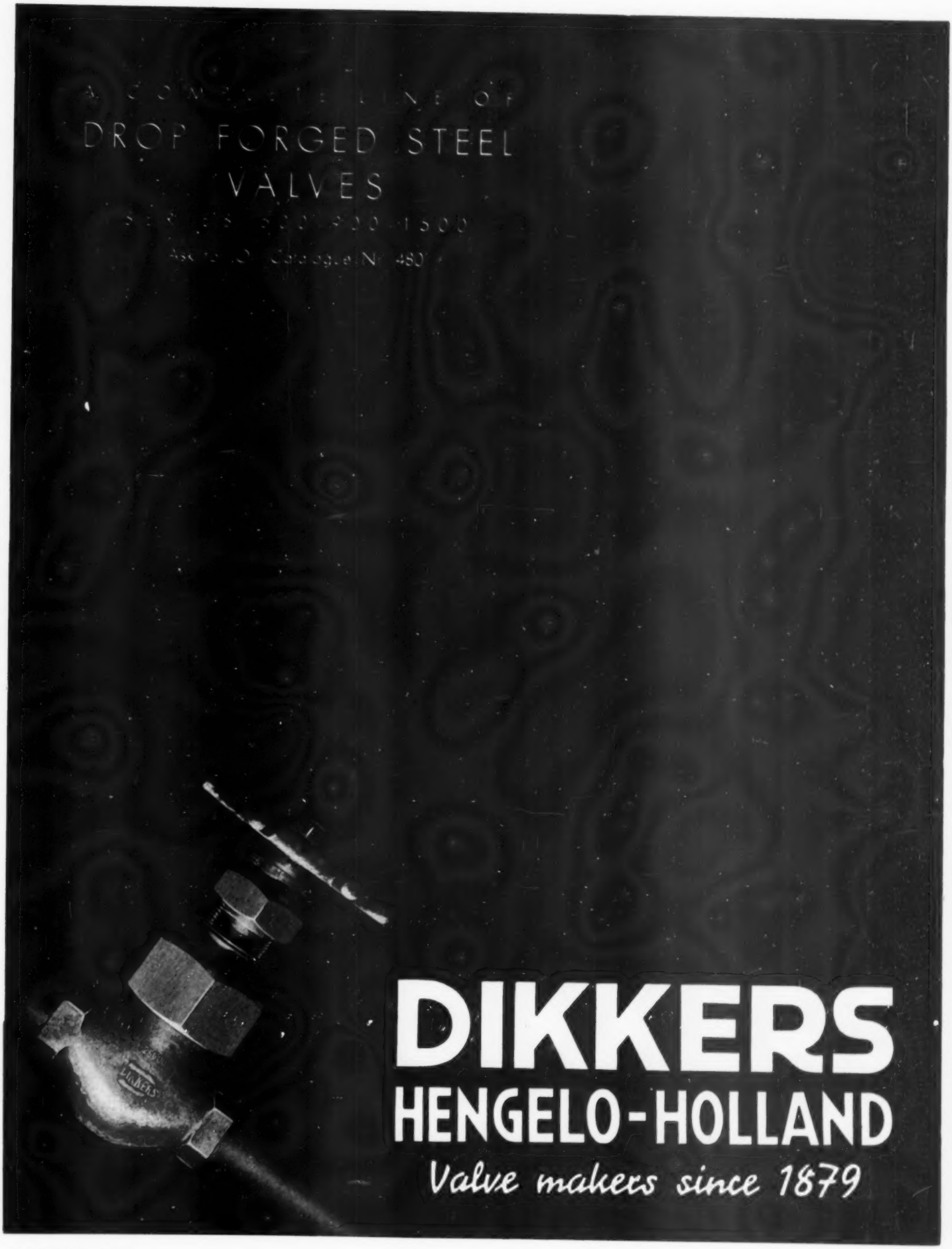

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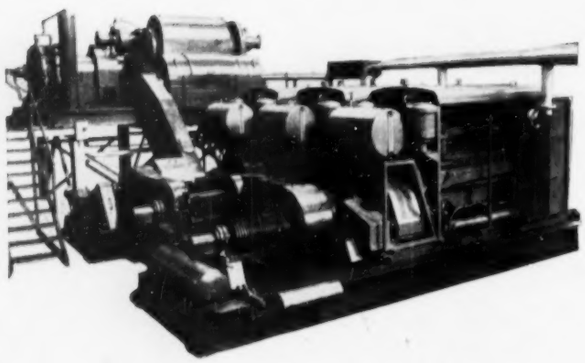

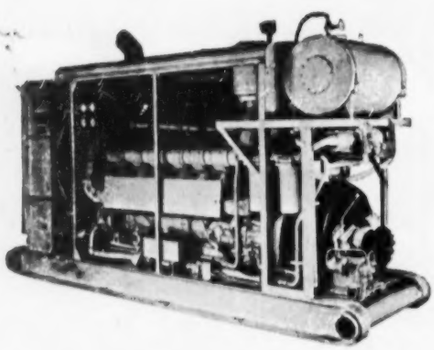

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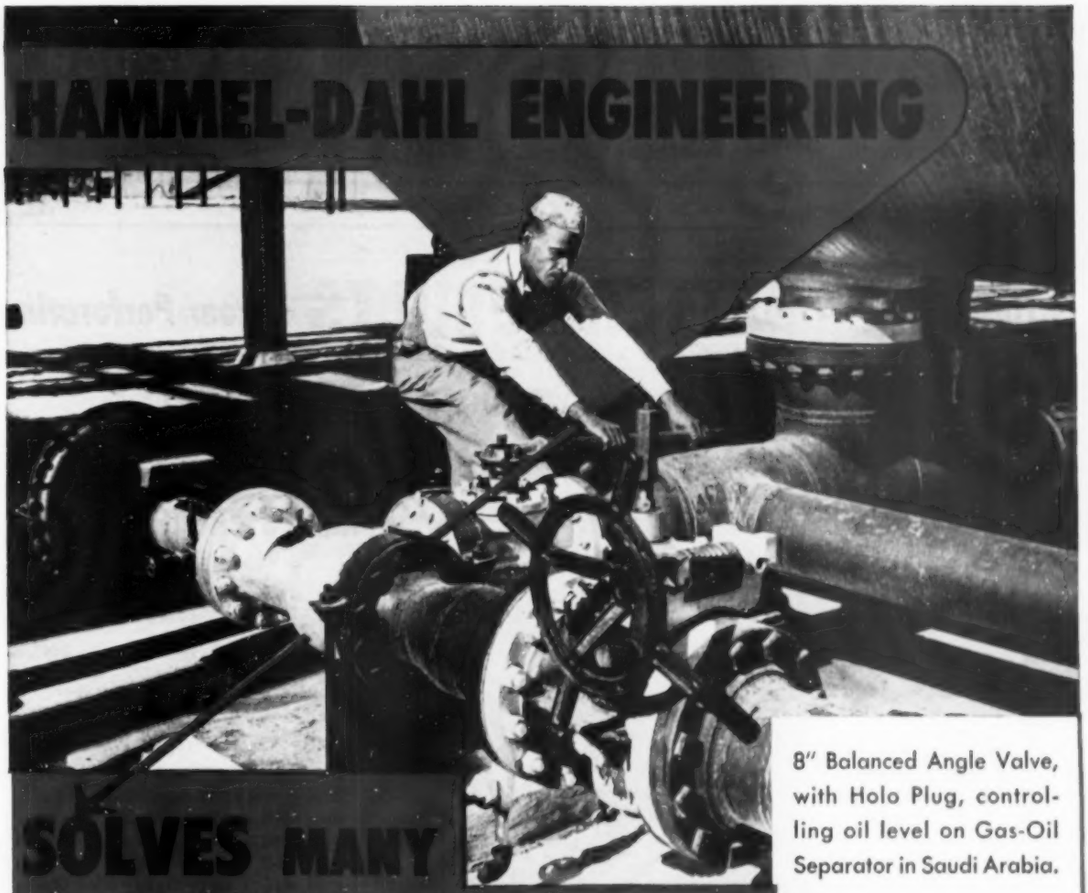

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difficult control problems which are intensified by—Desert Heat—Sandstorms—Ionization—Remoteness.

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Latest News About New Tools, Techniques and Services

How To Get BETTER RESULTS from Perforating

Improved McCullough Perforators Get More Oil in less Rig Time

HERE'S WHY

(Summary of advantages of McCullough Perforating Service)

IMPROVED McCULLOUGH M-3 BURRLESS BULLET PERFORATORS

1. 25% deeper penetration.
2. Burrless holes.
3. Simultaneous firing.
4. Holds all world records for speed and efficiency.
5. More sizes and types.
6. Deflecting bullets.
7. Up to 90 or more shots on one run in well.
8. Up to 30 or more feet of zone perforated on one run.
9. Up to six shots per foot.
10. Exact hole pattern and spacing.
11. World's hardest shooting Bullet Gun Perforator.

IMPROVED McCULLOUGH GLASS JET PERFORATORS

1. No slugs or carrots.
2. Flexible, junk-free strip carriers.
3. A type and size for every purpose.
4. Up to 600 shots at one time.
5. Up to six shots per foot.
6. Up to 100 feet of zone perforated on one run.
7. Simultaneous firing.
8. Cleaner, straighter holes.
9. More power in small casing.
10. World's hardest shooting Jet Gun Perforator.

HERE'S PROOF

(Actual jobs selected from recent McCullough field reports.)

1. New Well—3½", 30-shot McCullough M-3 Burrless Bullet Perforator used to shoot 600 holes between 12,400 feet and 12,500 feet through 5½" O.D. cemented casing. Formation was hard limestone. The well produced 1560 B/D after perforating. Time on the job —six hours.

2. This well was previously perforated by two different companies without results because of an excessively thick cement sheath behind the 7" O.D., 23 lb. casing. Six holes were shot between 6688 feet and 6690 feet with a 4¼" McCullough Glass Jet Perforator and Steel Strip Carrier. The well produced 50 B/D. Time on the job—two hours.

3. New well. 5½" O.D., 17 lb. casing was cemented in 9" hole. Hard limestone formation and an extra thick cement sheath. 3½", 30-shot McCullough M-3 Burrless Bullet Perforator shot 120 holes between 4430 feet and 4460 feet in two hours rig time for production of 100 B/D. A fine well for the field.

4. Formerly perforated for a production of 210 B/D. McCullough Glass Jet Perforator and Steel Strip Carrier shot 600 holes below 6000 feet through 7" casing. Time on the job —eleven hours. Production increased to 676 B/D.

Enthusiastic reports about the improved penetrating power of McCullough Perforators are coming in from operators everywhere. Find out how this can benefit you.

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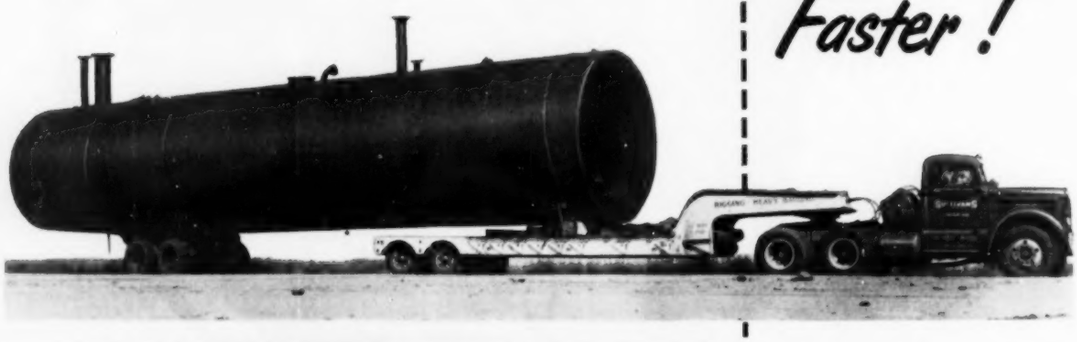

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This White WC2864ET has a real maneuvering job on its hands! Tank weighs 30 tons—60 ft. long. It's a 50,000 gal. storage tank—one of 30 being moved over rough fields to the new Lincoln Air Base by Sullivan's Transfer and Storage Co., Lincoln, Neb.

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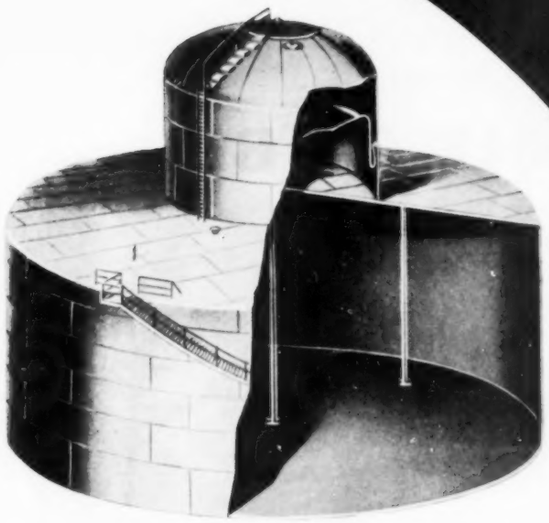

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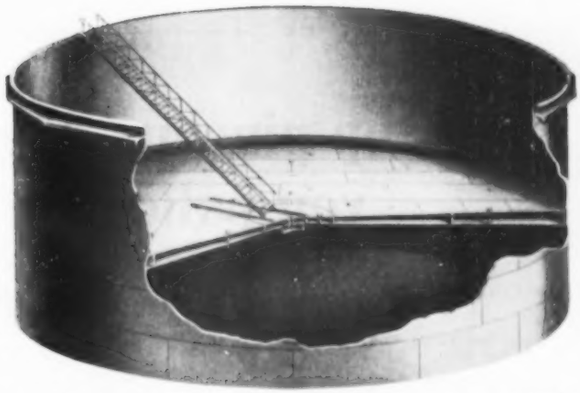
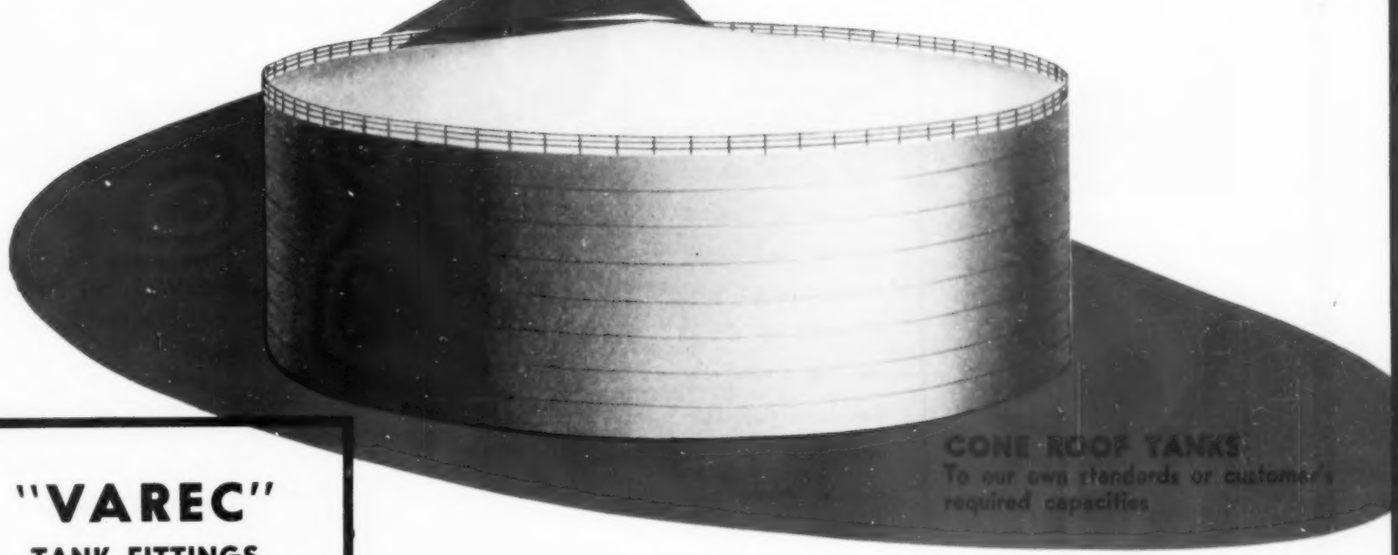


NEILL HAMMOND FLOATING ROOF TANKS



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Wm Neill & Son (St. Helens) Ltd., with a view to extending their service to the Petroleum Industry, have entered into an agreement with the Vapor Recovery Systems Company of Compton, California, U.S.A., to manufacture in Britain certain "Varec" tank fittings and accessories.

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These include: — "Neill Hammond" Double Deck Floating Roof Tanks, the "Neill Hammond" Pontoon and Pan type Floating Roof Tanks, also "Hammond Dialift" designed for the reduction of evaporation losses in existing as well as new storage.

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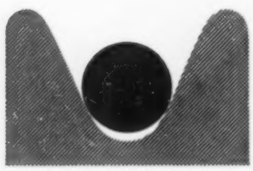
"Stop pinching me, you pulley!"

You can't punish ropes **and** expect to get the best out of them. So watch your PULLEYS and SHEAVES.

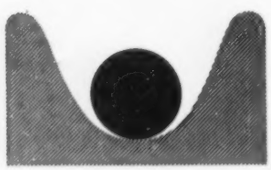
The radius of the groove of a pulley should always be slightly larger than that of the rope passing over it. If the groove is too narrow, it will crush the rope and soon damage the wires.

If too wide, the rope not only wears more quickly at the point of contact but also cuts a false groove in the pulley.

With sheaves, oil the bearings at frequent intervals and check that they rotate freely. A seized up sheave can ruin a rope very quickly. Watch alignment too; see that sheaves, drums and pulleys are set exactly in line with the rope that is working over them.



WRONG
Pulley groove too narrow.



WRONG
Pulley groove too wide.

RIGHT
Pulley groove correct—supporting the rope for 1/3rd. of its circumference.

Write for a copy of a new booklet "If Rope could Talk."

Pin up this announcement where your staff can see it. *It is issued in the interests of longer rope life by*

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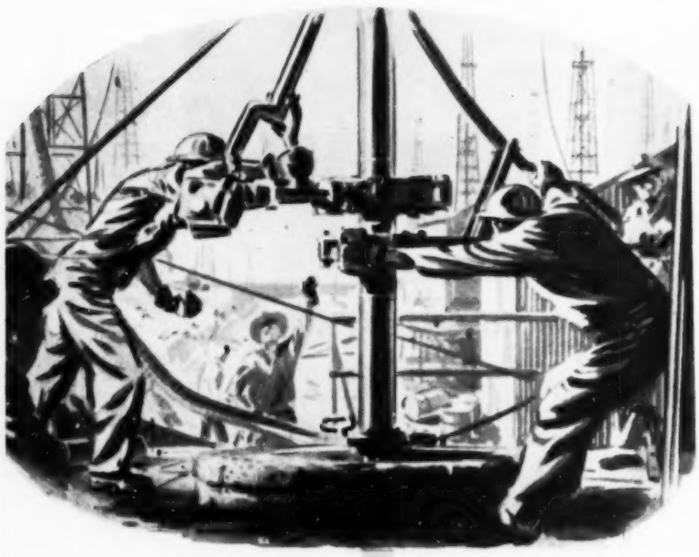
BIT BY BIT...



Unceasingly drilling bits are moving steadily downwards, opening up new Wells in Trinidad, U.S.A., Venezuela and the Middle East.

From both hemispheres, crude oil is pumped to the Refineries which produce the products distributed in the United Kingdom by the Regent Oil Company Ltd.

A wide variety of crude oils enables refinery technicians to ensure that the full range of petroleum products marketed by the Regent Oil Company are of the finest quality.

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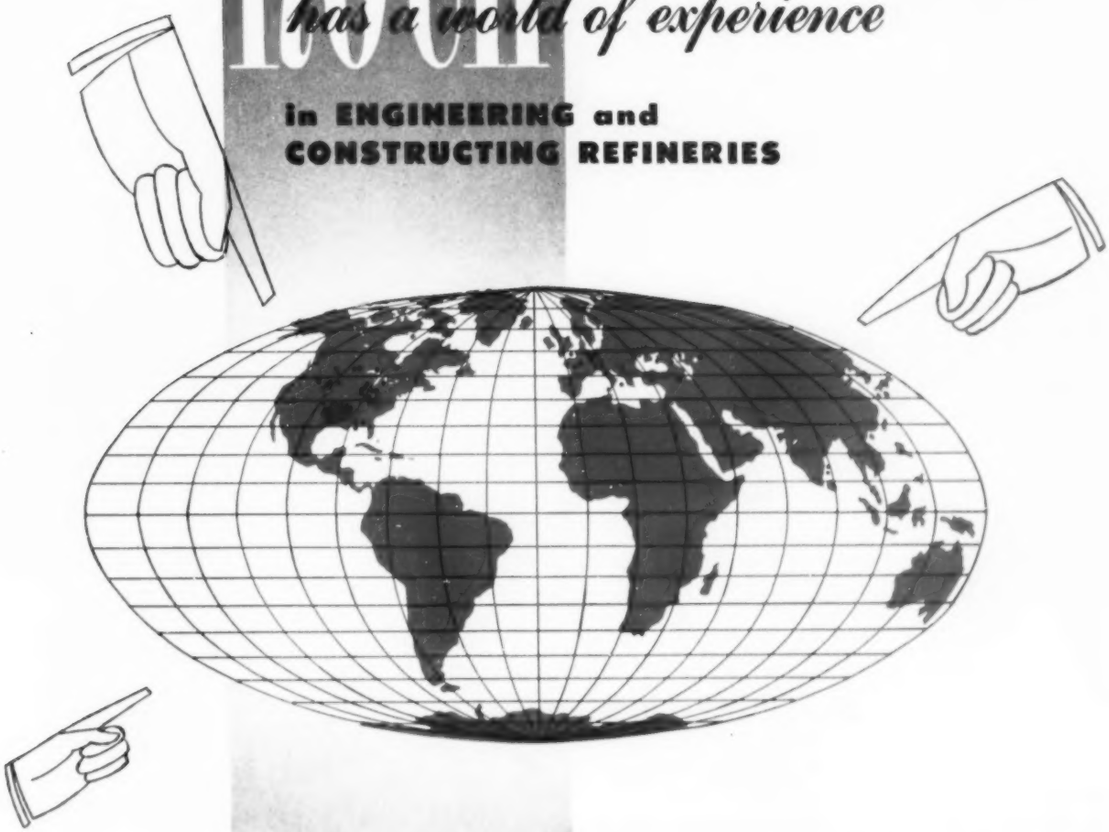

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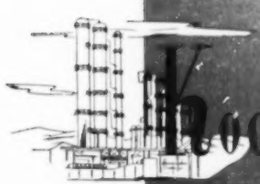

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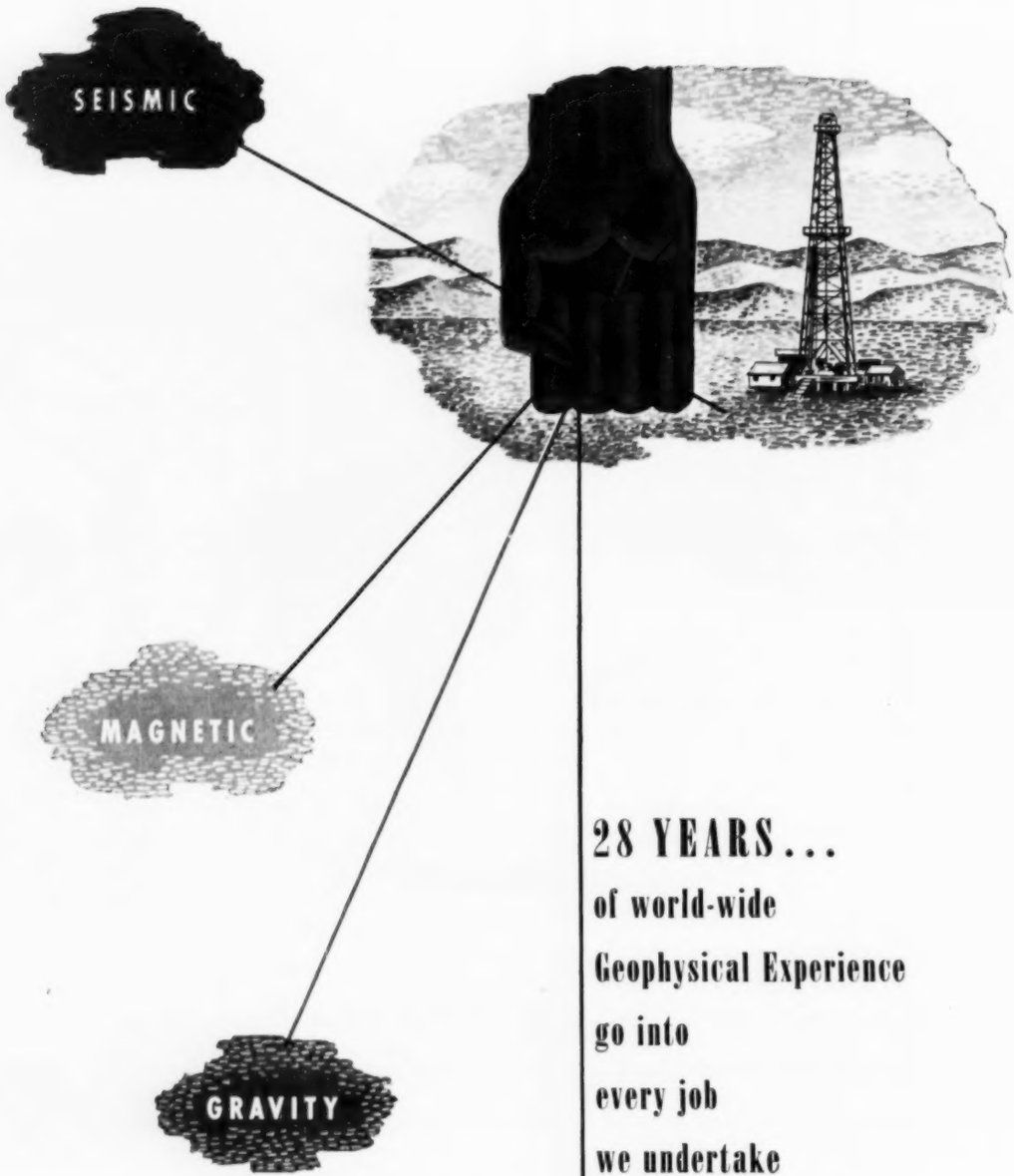

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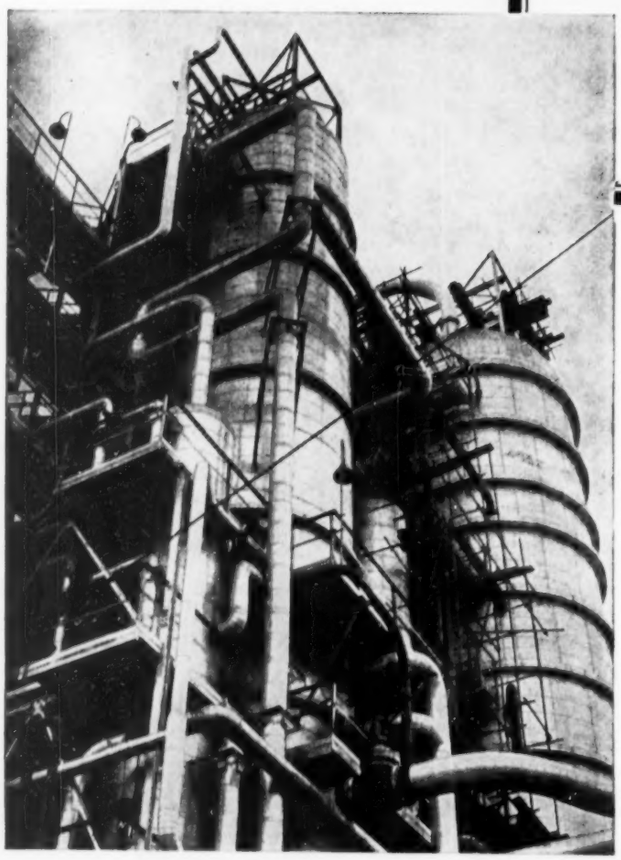
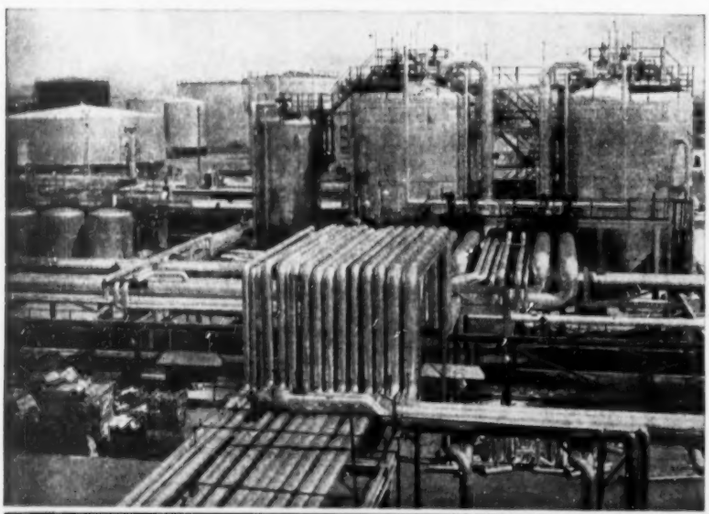
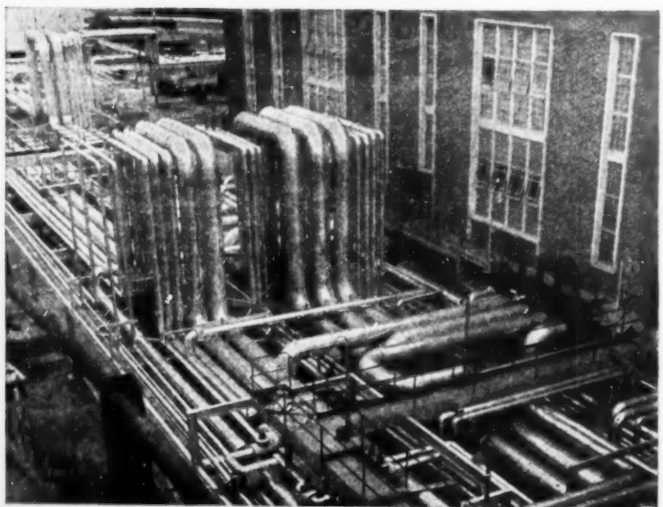
ROCKSIL
INSULATION COVERED WITH SHEET METAL



Kenyon were entrusted with the whole of the thermal insulation at Coryton Refinery. "Rocksil" was used covered with a sheet metal finish.

Write for facts and figures on this interesting new material.





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FOR PROCESS COMPRESSING

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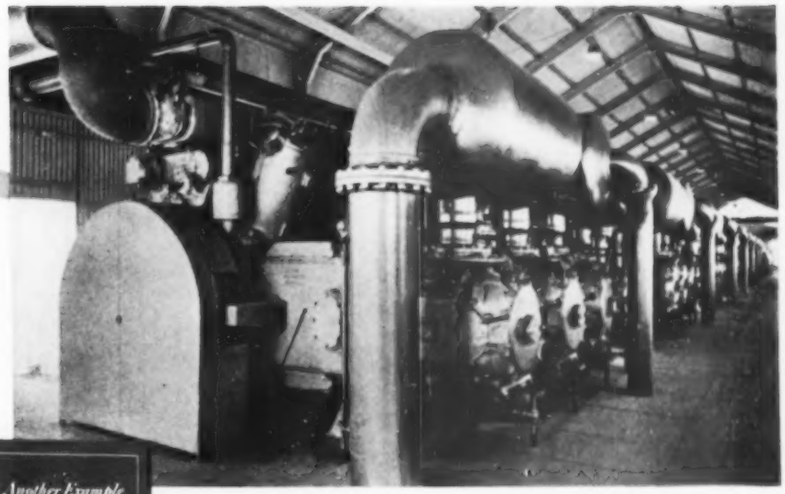
SCURRY COUNTY, TEXAS

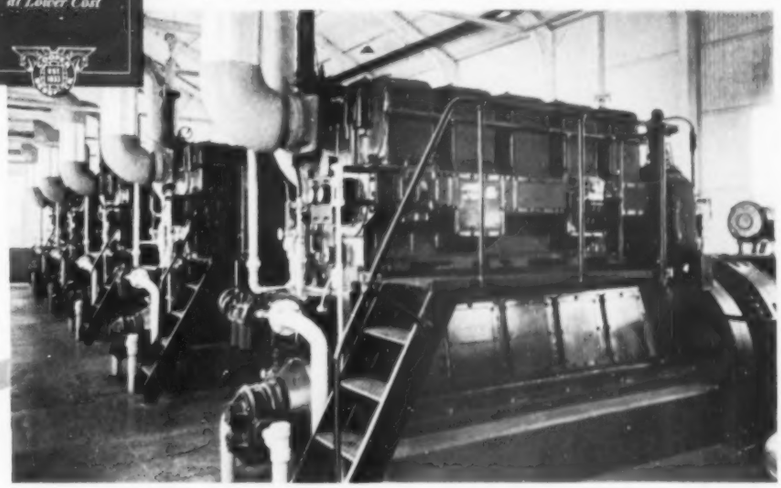
16,080 Cooper-Bessemer horsepower

FOR ELECTRIC GENERATION

Another Example of Efficient Power at Lower Cost



Above: Some of the Cooper-Bessemer GMV's, now totaling 13,200 compressor horsepower, in the Diamond "M" — Sharon Ridge Gasoline Plant, Scurry County, Texas. Below: In this same plant 6 long-lived Cooper-Bessemer 375 horsepower gas engines drive generators for all electrical power requirements.



• As shown opposite, modern Cooper-Bessemers team up to meet over-all power requirements at the Diamond "M"—Sharon Ridge Gasoline Plant, Scurry County, Texas. This plant now has twelve 1100 HP GMV's, each equipped with three compressor cylinders for 3-stage compression to 525 psi.

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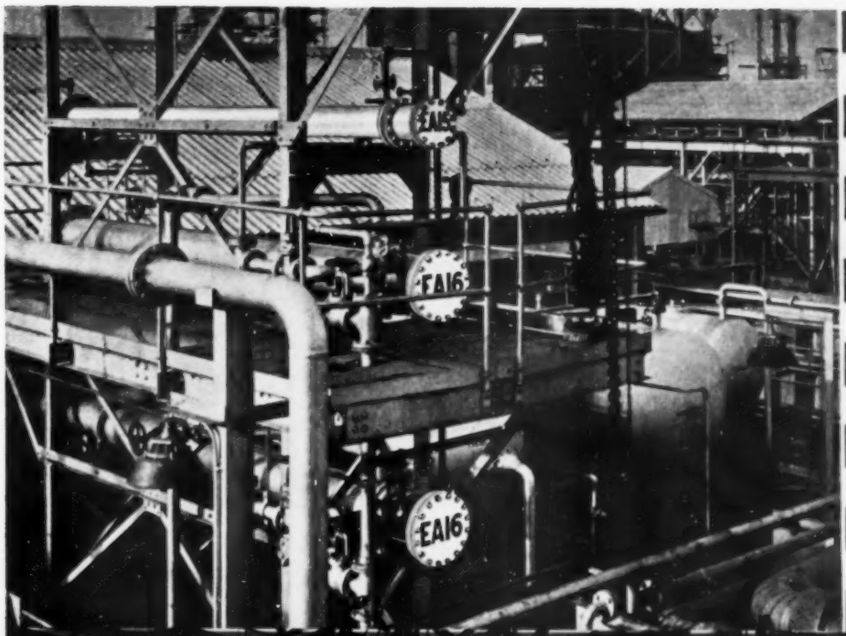
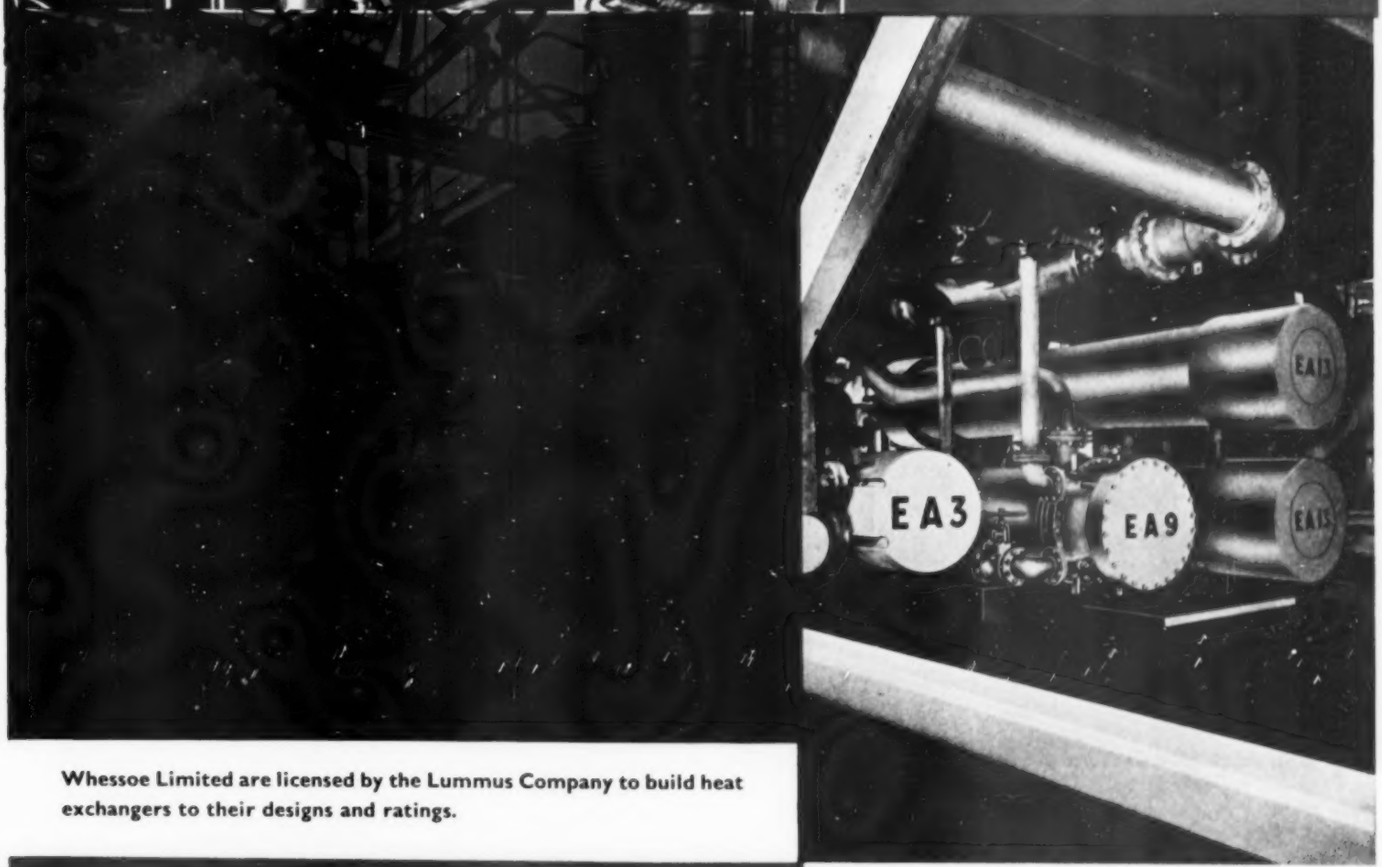


Some of the Lummus-designed heat exchangers manufactured by Whessoe for the Reformer Unit at Shell's Stanlow Refinery, Ellesmere Port, Cheshire, are illustrated. The photograph shows a Gland Seal Oil Cooler and two Fresh Water Jacket Coolers, a Debutanizer Condenser and two Gasoline Condensers, a Debutanizer Heat Exchanger, Debutanizer Cooler and two Gasoline Exchangers.



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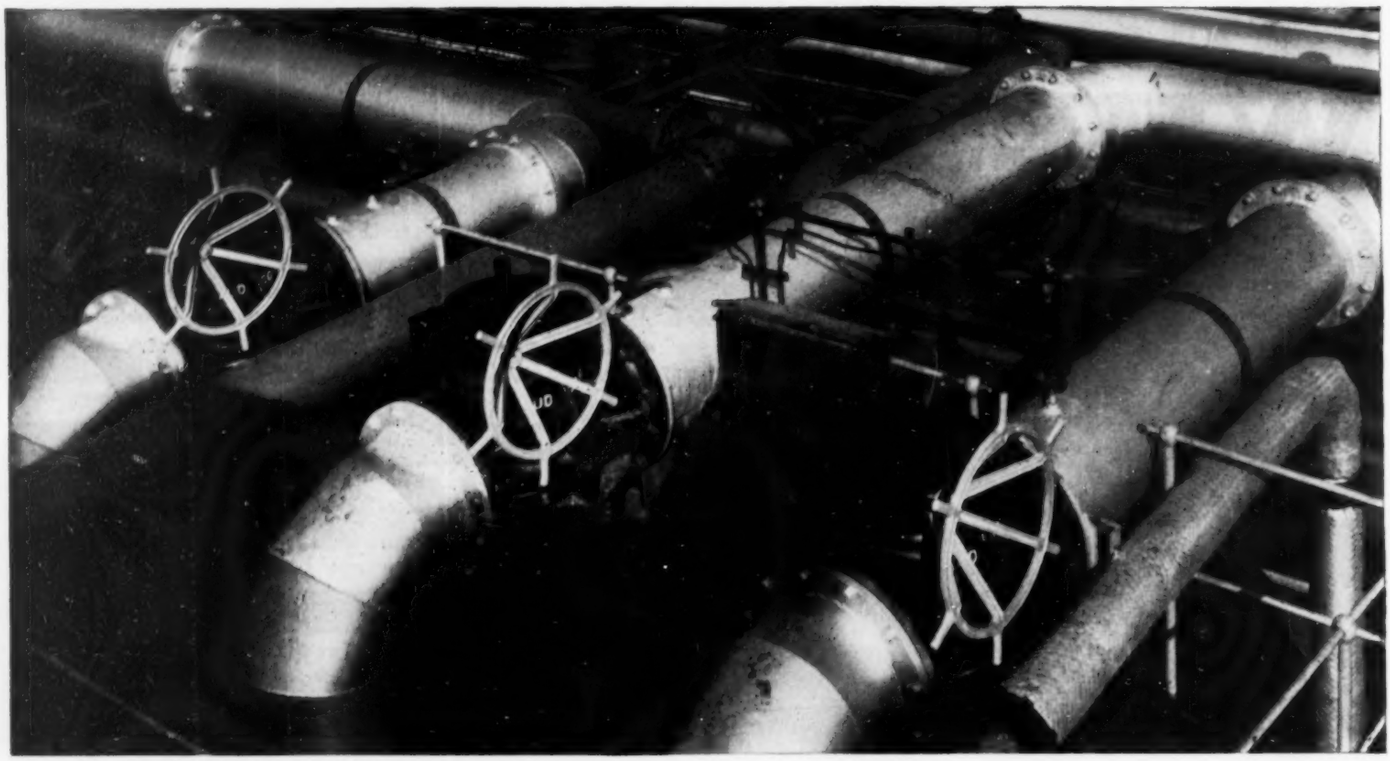
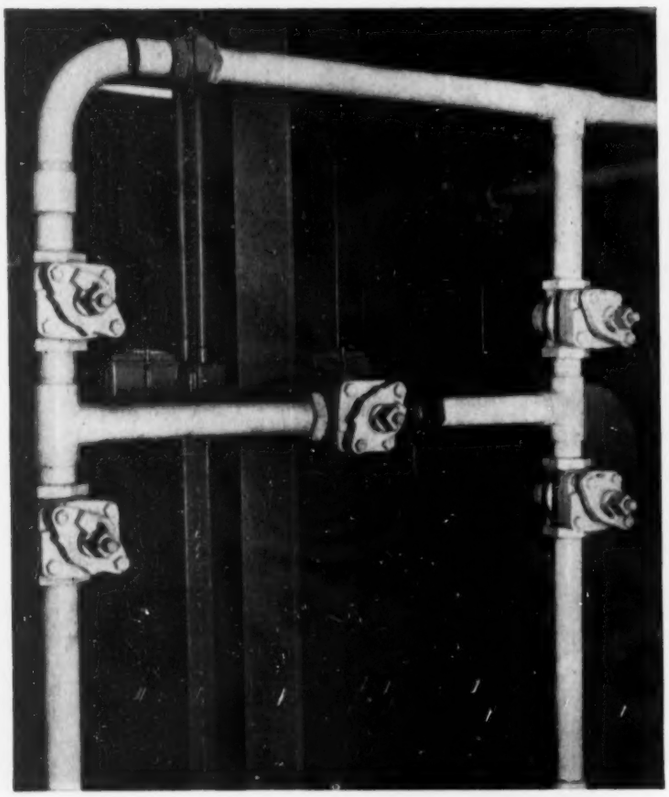


Gear operated Audco-Nordstrom valves installed on gas lines at a British coke oven plant.



Wrench operated Audco-Nordstrom valves installed on chemical lines in a European drug company.

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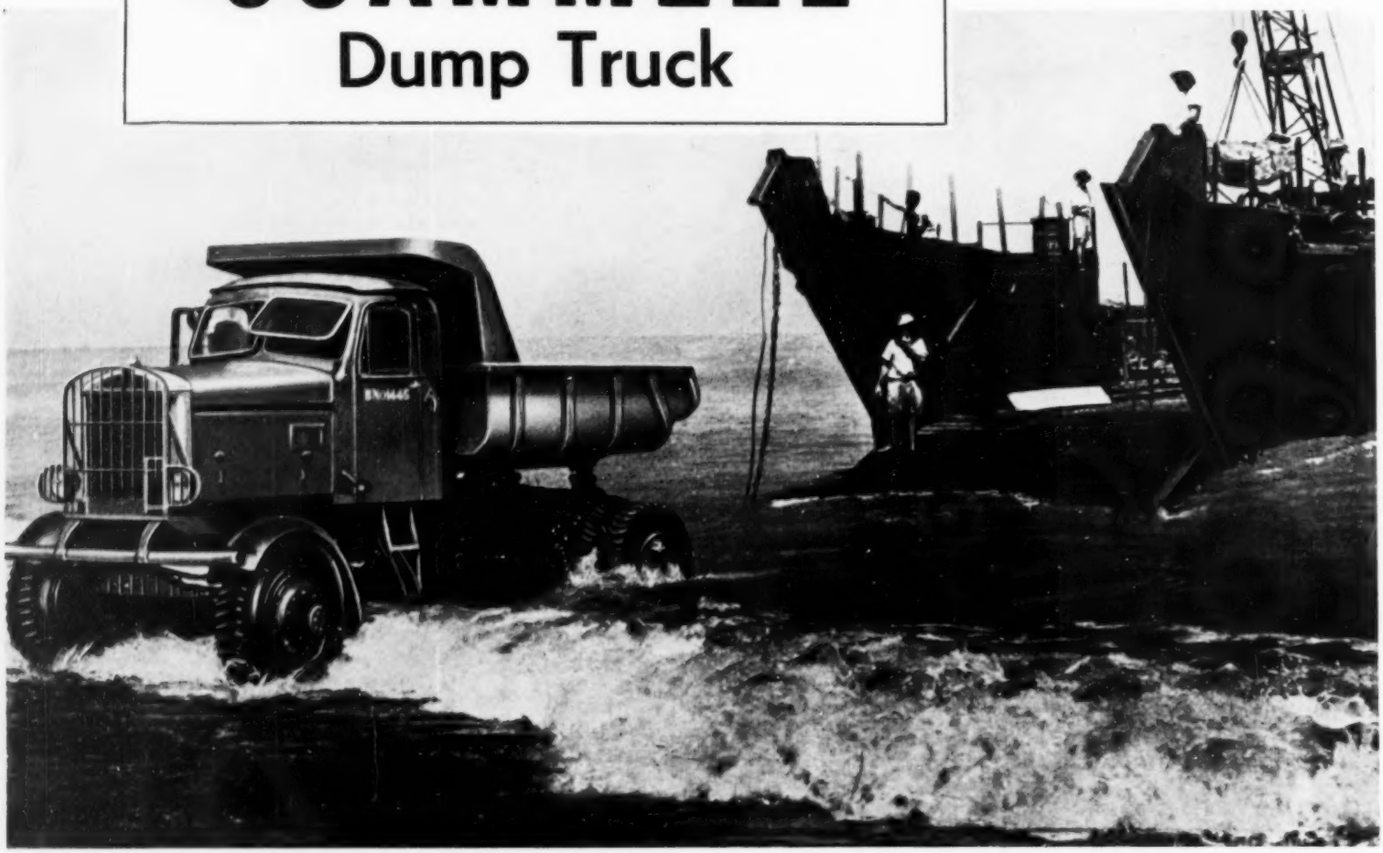

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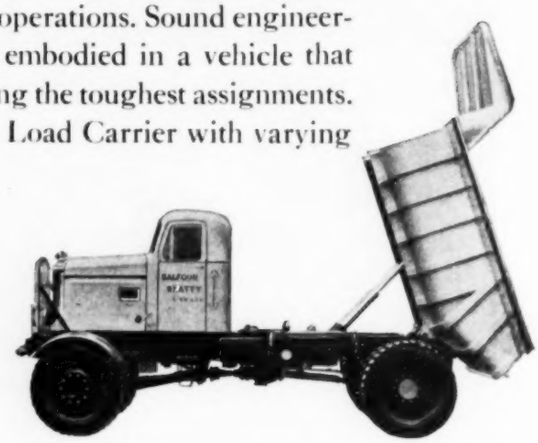

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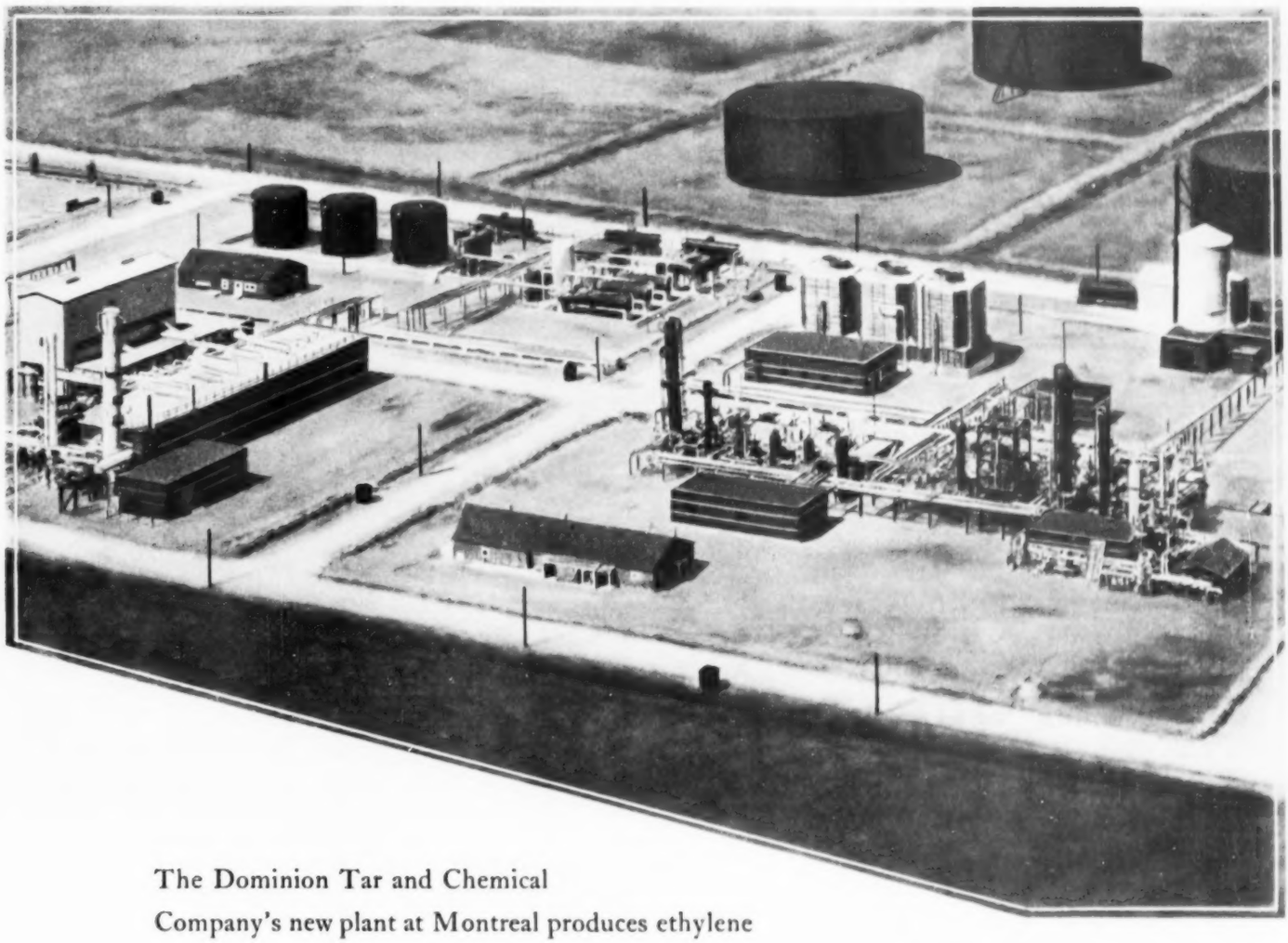

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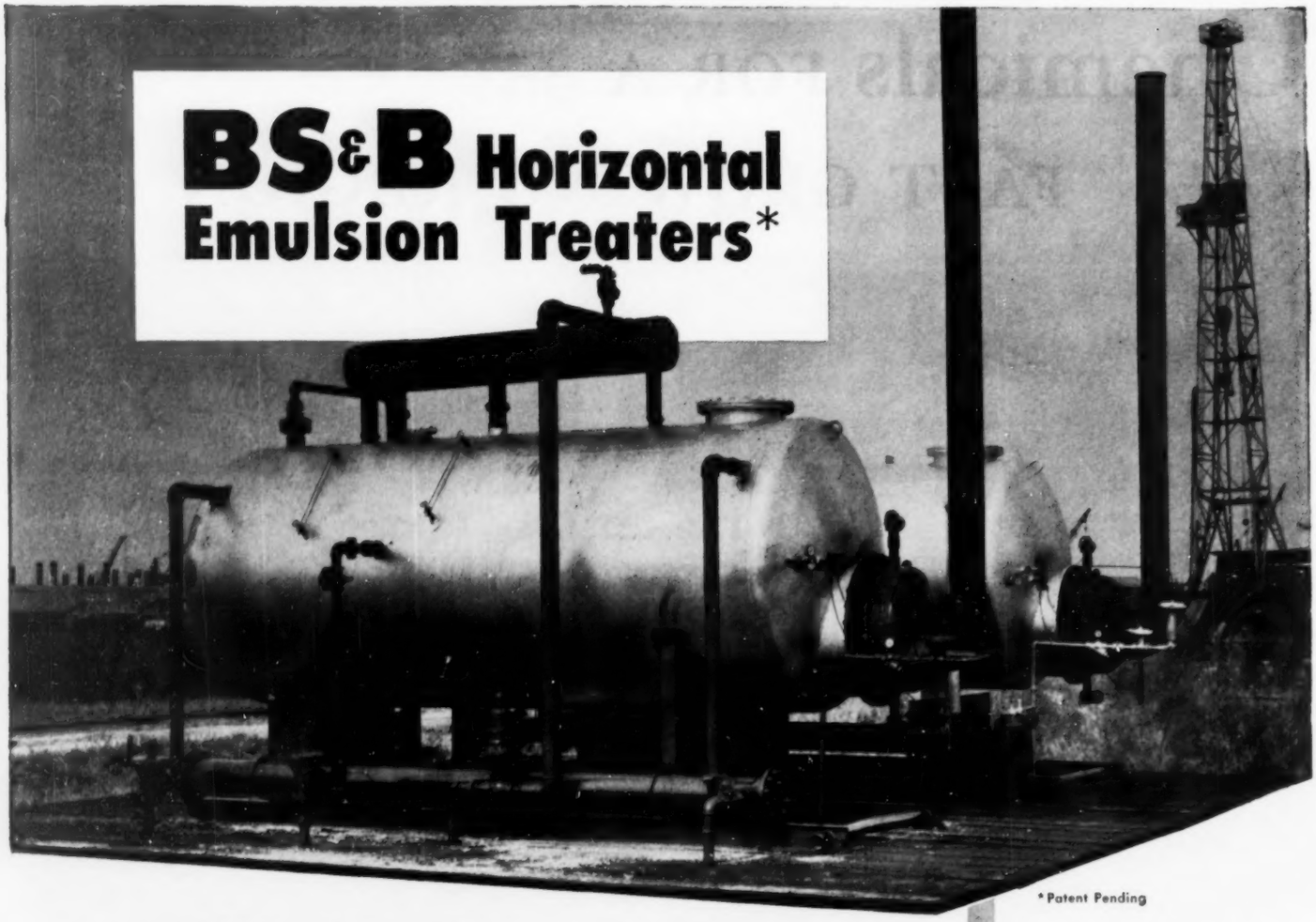

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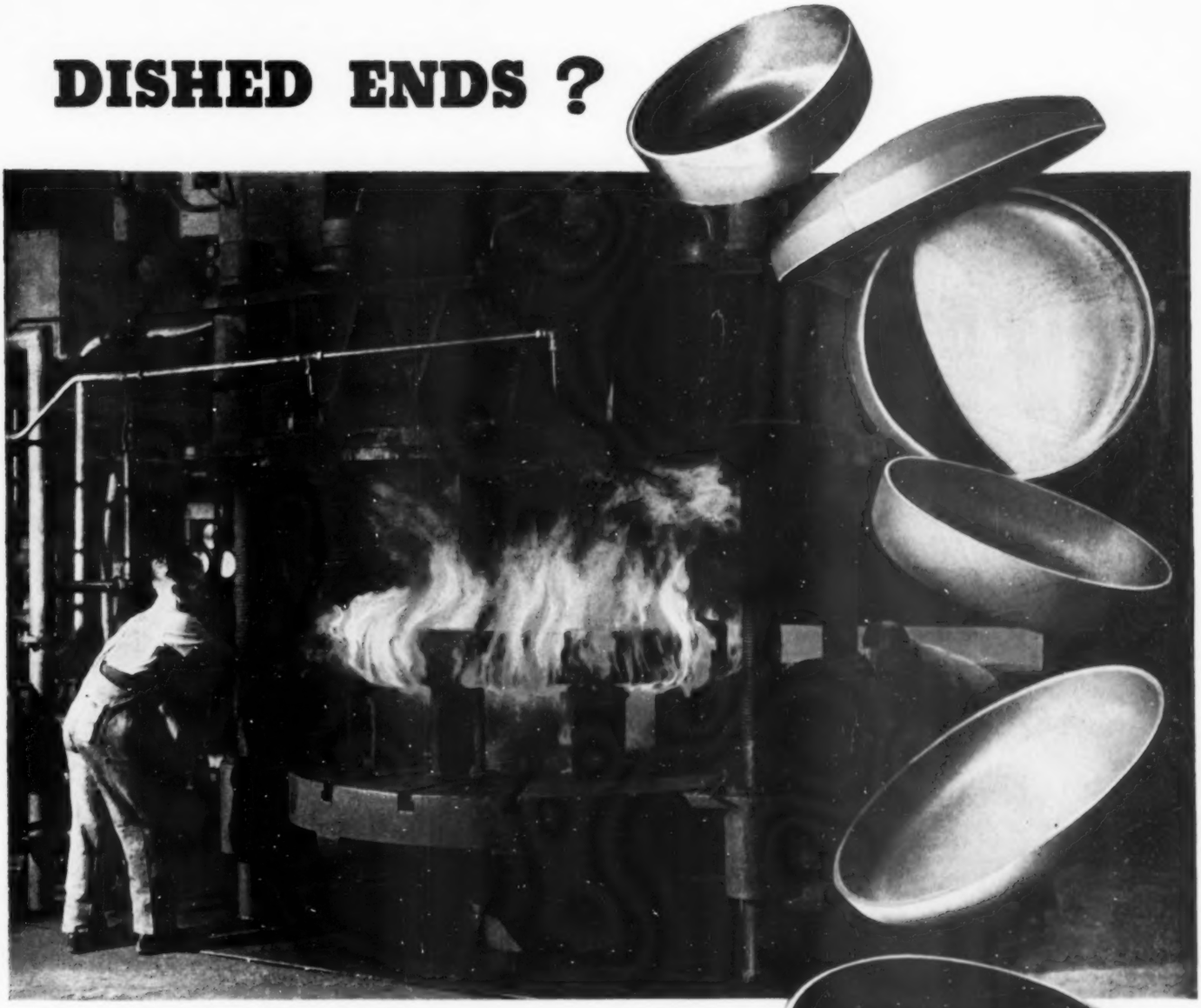

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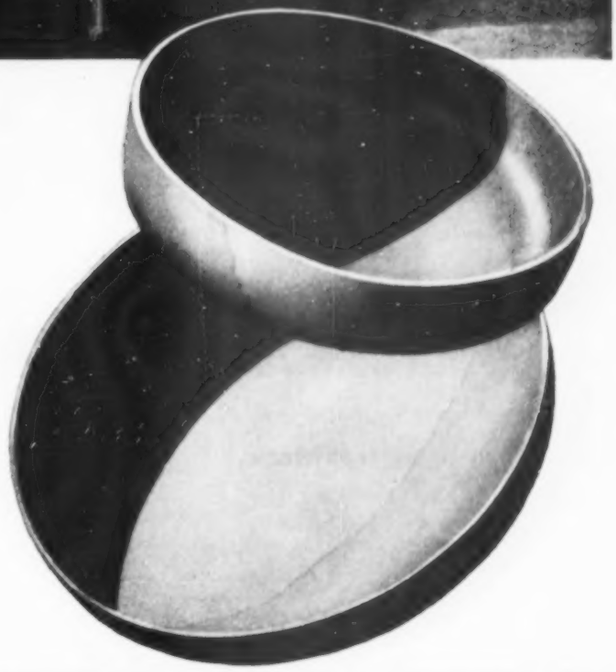

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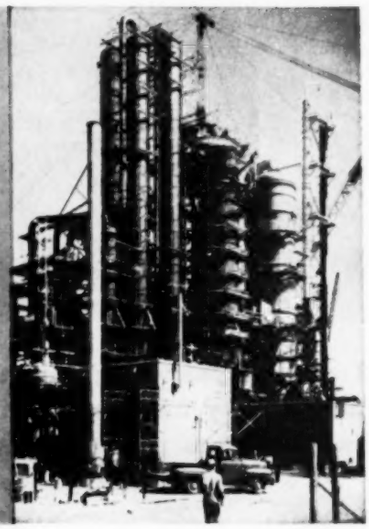

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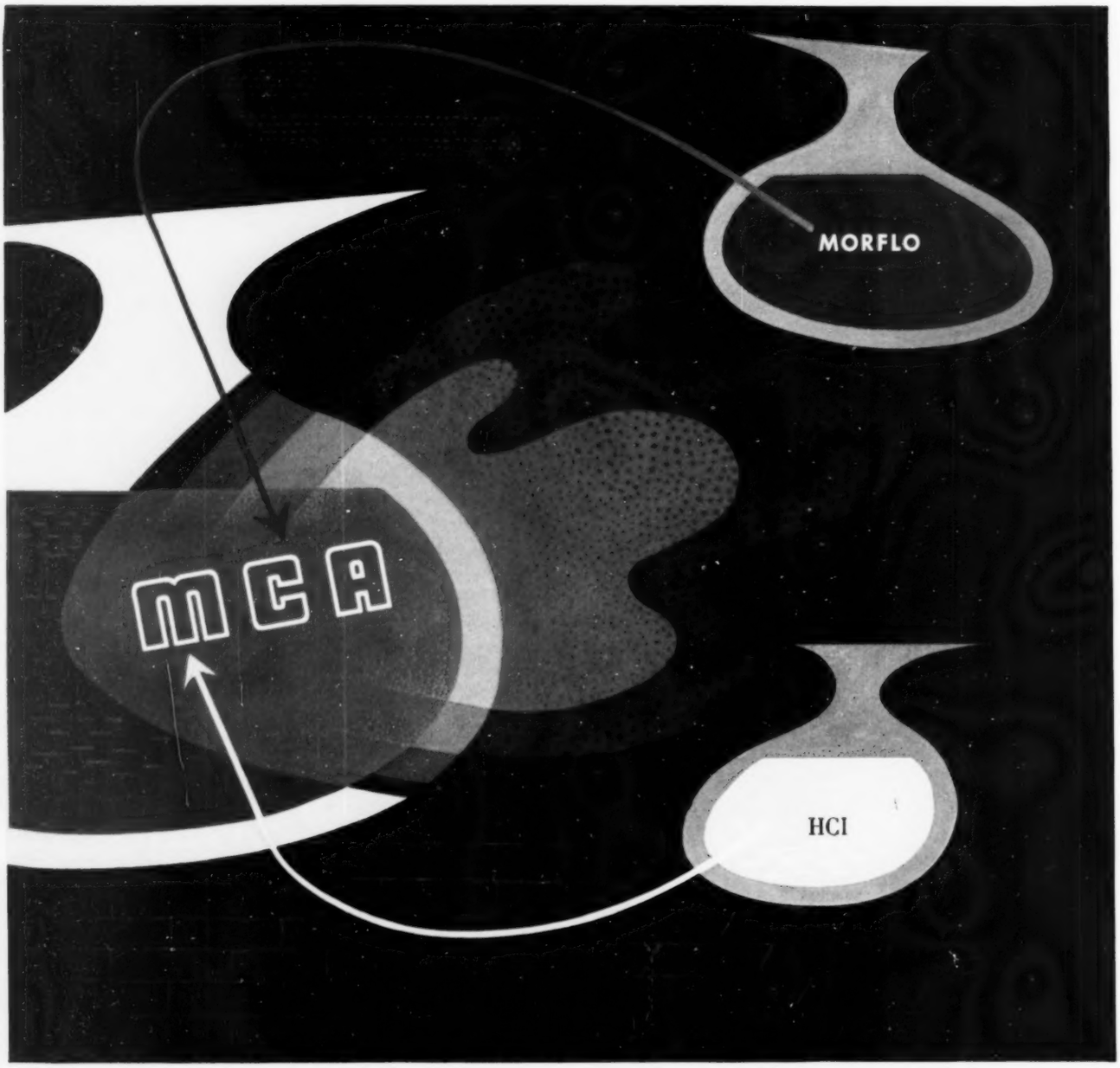
THIS MONTH'S COVER

A Creole Petroleum Corporation drilling operation on Lake Maracaibo, Venezuela. Power for the drilling rig mounted on the lake platform is supplied by a specially-equipped barge at the left of the derrick. Color plates are reproduced through the courtesy of Creole, which employed Jack Hearne, a New York commercial artist, to prepare the painting for its 1952 annual report to stockholders.



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WORLD OIL'S CHANGING PANORAMA

YEAR by year, the pattern of the world oil industry, which has been changing over a long period, but in which the alteration has been proceeding most rapidly since the end of World War II in 1945, is taking more definite form. Its outstanding feature is the gradual lessening of the predominant position which the United States held for half a century and the corresponding growth and spread of the industry to other parts of the globe.

On the side of world production, the share held by the United States, which was increased during World War II by the circumstances of that struggle after showing a declining trend for some years preceding, stood at a little over 66 percent in 1945. The country was producing oil in quantity sufficient to supply its own requirements and to provide a surplus for export of 26 million short tons. This was an abnormal situation, since America was meeting the greater part of the heavy military requirements of the time while imports were at their low ebb.

Following the war, the pent-up demand for petroleum products made itself felt in a rapid rise in civil consumption in all parts of the world. By 1950, production in the United States had increased by 327 million barrels, or more than 18 percent, but at the same time imports had risen by nearly 97 million barrels while exports had decreased by 72 million. To satisfy the growth in domestic demand of 34 percent there had been, in addition to the enlargement of domestic production of 168 million barrels, a gain in available supply of 168 million through the decline in exports and the increase in imports. Through 1952 the same trend has been in effect with production up to 2,281 million barrels, imports at nearly 350 million barrels and exports just short of 160 million barrels to meet a total domestic demand of 2,660 million barrels.

With the transition of the United States from the position of being a purveyor of petroleum to all the world to that of being a net importer on a steadily rising scale, it was imperative for other countries to develop new sources of supply to serve their rapidly growing demands. The lessons of World War II had awakened the governments and peoples of every nation to the vital importance of petroleum for their own security and its value as the foundation of industrial progress. There were other factors as well, such as dislocation of the supplies of other forms of energy on which reliance formerly had been placed. As restoration of war-shattered economies permitted, there developed a tremendous demand for petroleum products and particularly for fuel oil.

It had been the policy of Americans, and one encouraged by their government, to extend their operations and investments to other lands.

Due in no small part to their efforts, a number of highly prolific oil fields were developed in the Near and Far East in time to meet the new and expanding demand.

Between 1945 and 1950, production by countries other than the United States was more than doubled, rising from 881 million barrels in 1945 to over 1,800 million in 1950. During the same period, consumption in these same areas grew at the rate of 10 percent or more year by year. As a result of this transition, the flow of crude oil and products eastward across the Atlantic which formerly provided the bulk of supply, not only for the industrial areas of western Europe but also the needs of the whole eastern world, has now declined to a fraction of its former proportions. In 1952 this movement was down to roundly 450,000 b/d and indications are that it will be still lower in the current year. At the present rate of output, the countries of the Eastern Hemisphere in 1953 will produce a volume of oil equivalent to 90 percent of the estimated requirements of that hemisphere for consumption.

Along with the rapid increase in production in the eastern half of the globe has gone a corresponding growth in transportation and refining facilities. While the daily throughput capacity of Eastern Hemisphere refineries is still less than one half that of the western countries, the numerous large construction projects under way in the Near and Middle East, Australia and the Far East indicate that the gap will be substantially narrowed within the next two years.

One effect of the readjustment that has taken place is seen in the recent promulgation of Middle East quotations independently of the long held position of the United States Gulf Coast as supplying the basis for all world prices. This is a change that no doubt will become more firmly established as time goes on. The emergence of oil as a truly global industry is certain to bring other changes in its wake. It is a peculiar coincidence that at this juncture a serious movement is being pushed in the United States to isolate its industry by excluding imports.

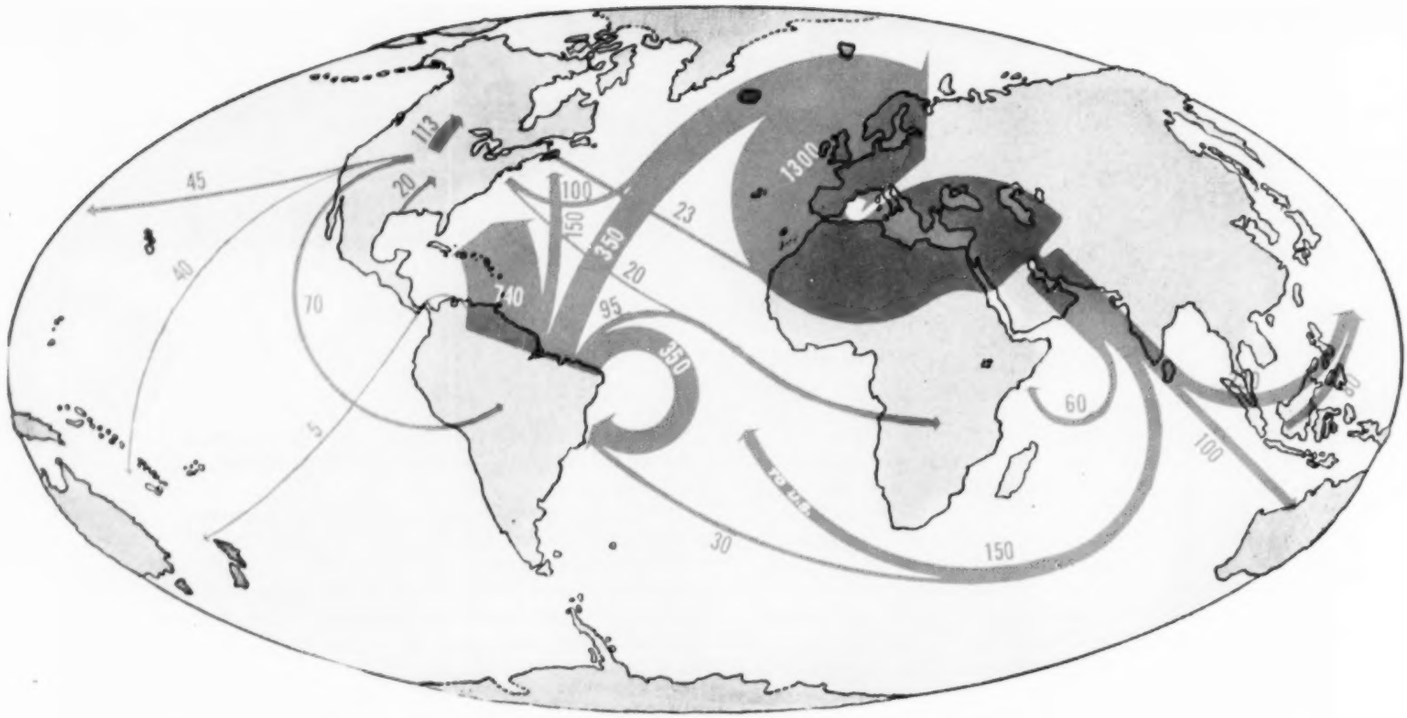


Chart indicating principal intercontinental movements of petroleum and products in 1952. Figures indicate approximate shipments in thousands of barrels daily. Arrows are not intended to indicate route followed, only origin and destination continents.

WORLD OIL CONSUMPTION UP 6.6 PERCENT

WORLD DEMAND for petroleum in 1953 is estimated at 13,638,000 barrels daily on the basis of operations in the first half year. The increase anticipated is 6.6 percent compared with preliminary reports of 1952 consumption totaling 12,789,000 b/d.

Demand last year in the world as a whole was 5.2 percent greater than in 1951, when the average was 12,161,000 b/d.

The improvement has been sparked by increased sales in the United States which constitute about 57 percent of global consumption. In 1952 United States domestic markets were curtailed by two extensive strikes, one in oil and one in steel. Result was that domestic demand rose only 2.3 percent in the first half year. The second half was better, but for the year as a whole the increase was only 3.3 percent.

The past winter was mild in the United States and fuel oil sales were light. As a result, U.S. demand in the first quarter of 1953 was only 3.5 percent greater than a year ago. Since that time, however, the rising trend has been more marked. May shipments to domestic consumers were 8.9 percent higher than a year ago and June also made a good showing compared with the steel strike period in 1952. Second quarter domestic demand in 1952 totaled only 610 million barrels. This year the U.S. Bureau of Mines estimated second quarter domestic demand at 663 million barrels, an increase of 8.7 percent, bringing the first half total 5.9 percent higher than 1952.

In making up new estimates for the second half of the year, the Bureau of Mines has forecast a total domestic demand for the year of 7,732,000 b/d compared with 7,281,000 b/d in 1952, an increase of 6.2 percent.

The Bureau believes now that middle distillate consumption will be 7.1 percent higher this year than last, motor fuels 6.6 percent, residual fuels 3.6 percent and kerosine only 1.6 percent.

Petroleum consumption outside the United States in 1953 is estimated at 5,900,000 b/d, an increase of 392,000 b/d or 7.1 percent over last year.

In the western hemisphere, total demand is expected to be 6.2 percent above 1952, while demand outside the United States in the hemisphere probably will

Demand for petroleum products during 1953 is expected to approximate 13,600,000 barrels daily. United States domestic demand is running 5.9 percent ahead of last year.

rise 6.65 percent above last year. The rate of increase in 1952 had been at about 10 percent.

Eastern hemisphere demand for oil continues to rise at a sharper rate than in the west. The increase this year is estimated at 7.5 percent, compared with 7.6 percent a year earlier.

It will be observed from these calculations that the sharp rate of rise in the world's demand curve at the close of World War II is now beginning to flatten out.

A few countries stand out in both hemispheres. In North America, Canada is enjoying boom times in mining and forest products. In the first three months of 1953, indicated demand for principal products in Canada totaled 36,978,000 barrels compared with 33,691,000 barrels in the same period last year. The increase was 9.8 percent. On this basis, Canada may well become the world's third largest consuming nation this year, passing the United Kingdom. For purposes of the present estimate, Canadian demand for 1953 has been forecast at 496,000 b/d, an increase of 9.7 percent. United Kingdom demand has been estimated at 493,000 b/d.

In Latin America, Venezuela and Brazil, among the larger nations, are enjoying a continuation of rapid business expansion. In both countries it is estimated that demand this year will continue to rise at a 10 percent annual rate.

Foreign exchange has been tending to interfere with a normal pattern in Brazil, which must import virtually all of its oil from abroad. In the early months of this year, Brazilian oil imports were sharply lower. There is no indication as yet, however, that the annual rate of increase in consumption has been halted. Meanwhile, Brazil is working out barter agreements with neighboring countries with surplus crude production to supply the large new refining industry under construction.

Inland consumption in Venezuela continues to rise rapidly and now exceeds 100,000 b/d. Bunker sales have been lower this year in both Venezuela and the West Indies.

A committee of economists in Colombia has reported to the government that demand for white products will rise 9.2 percent yearly and fuel oil 5.2 percent per year between now and 1960. This year's consumption is estimated at 27,000 b/d and 1954 at 34,400 b/d. The committee has concluded that the nation will need another 25,000 b/d refinery within the next few years.

In the eastern hemisphere, Japan and West Germany are outstanding examples of countries which are rapidly expanding their requirements for petroleum. Japan is expected to increase its consumption this year by at least 39 percent to about 125,000 b/d. Some authorities think that the volume may exceed this. Germany

(Please turn to page 144)

ESTIMATED WORLD CONSUMPTION OF PETROLEUM AND PRODUCTS

(Crude Equivalent Basis)

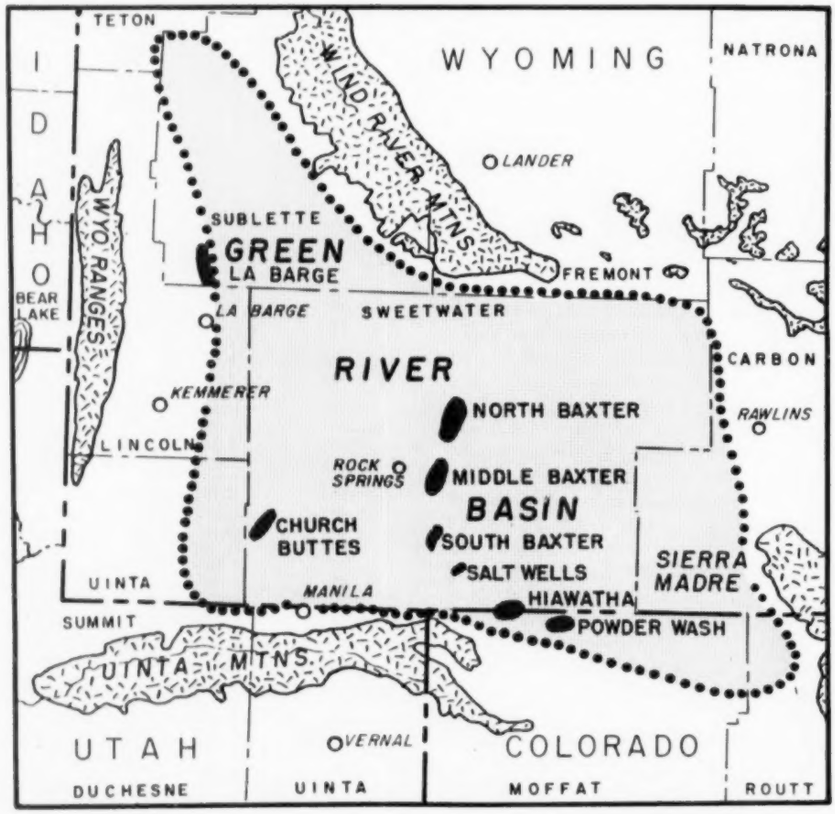
(Thousands of Barrels)

	1952		1953		
	Total	Daily Average	Total	Daily Average	Percent Change
Canada	165,432	452	181,040	496	
United States	2,664,846	7,281	2,822,180	7,732	
Mexico	73,200	200	76,650	210	
N. America	2,903,478	7,933	3,079,870	8,438	+ 6.4
Argentina	70,638	193	73,000	200	
Brazil	45,384	124	49,640	136	
Chile	10,248	28	11,315	31	
Colombia	9,150	25	9,855	27	
Cuba	18,666	51	19,710	54	
Neth. West Indies	56,364	154	54,750	150	
Peru	10,614	29	10,950	30	
Trinidad	14,274	39	14,600	40	
Uruguay	8,418	23	8,395	23	
Venezuela	35,502	97	39,055	107	
Others	20,862	57	22,630	62	
S. America & Caribbean	300,120	820	313,900	860	+ 4.9
WESTERN HEMISPHERE	3,203,598	8,753	3,393,770	9,298	+ 6.2
Belgium	25,254	69	28,105	77	
Denmark	14,274	39	14,965	41	
Finland	4,758	13	5,475	15	
France	102,480	280	109,500	300	
Germany (Western)	50,874	139	58,765	161	
Greece	9,150	25	9,125	25	
Ireland	6,222	17	6,570	18	
Italy	51,240	140	56,210	154	
Netherlands	34,404	94	35,770	98	
Norway	13,542	37	14,235	39	
Portugal	7,686	21	8,030	22	
Spain	13,176	36	13,870	38	
Sweden	37,332	102	40,150	110	
Switzerland	9,882	27	10,220	28	
United Kingdom	169,092	462	179,945	493	
Yugoslavia	3,660	10	4,015	11	
USSR	347,700	950	379,600	1,040	
Others	113,094	309	113,150	310	
Europe	1,013,820	2,770	1,087,700	2,980	+ 7.6
Algeria & Tunisia	13,908	38	14,235	39	
Brit. E. Africa	6,588	18	6,935	19	
Egypt	31,476	86	33,580	92	
Ethiopia & Fr. Somaliland	3,294	9	3,650	10	
So. Africa	28,548	78	31,390	86	
Fr. Morocco	6,222	17	6,570	18	
West Africa	20,496	56	20,805	57	
Others	12,444	34	12,410	34	
Africa	122,976	336	129,575	355	+ 5.6
Aden	16,470	45	17,885	49	
Bahrain	4,758	13	5,110	14	
Iran	10,980	30	8,395	23	
Iraq	5,490	15	5,840	16	
Israel	7,686	21	8,760	24	
Saudi Arabia	15,006	41	16,425	45	
Syria & Lebanon	6,588	18	8,395	23	
Turkey	6,594	19	7,665	21	
Others	13,908	38	14,600	40	
Middle East	87,540	240	93,075	255	+ 6.3
Australia	43,920	120	45,990	126	
Ceylon	6,588	18	6,935	19	
Hong Kong	4,392	12	3,285	9	
India	34,038	93	35,040	96	
Indonesia	18,300	50	20,075	55	
Japan	32,940	90	45,625	125	
Malaya	18,300	50	19,710	54	
New Zealand	10,980	30	11,680	32	
Pakistan	10,980	30	11,680	32	
Philippines	11,712	32	10,950	30	
S. Viet Nam	5,490	15	5,840	16	
Thailand	3,660	10	3,285	9	
Others	51,240	140	53,655	147	
Far East & Oceania	252,540	690	273,750	750	+ 8.7
E. HEMISPHERE	1,477,176	4,036	1,584,100	4,340	+ 7.5
WORLD TOTAL	4,680,774	12,789	4,977,870	13,638	+ 6.6

Increased activity marks the Green River Basin

By Maury Goodin
Petroleum Information, Denver-Casper.

Map of the Green River Basin area, showing principal fields.



THE "Green Table" and "Green River Basin" may have great significance for the oil and gas men of the Rocky Mountain Region if present wide exploration through this basin is as successful as indicated. "Green Table" is the English equivalent of the Spanish "Mesaverde," a thick sedimentary zone of upper Cretaceous age that covers the Green River Basin of Wyoming and Colorado. Both oil and gas discoveries in the Mesaverde during the past year have given impetus to future possibilities for sizeable reserves in that formation throughout the basin. At the present time more than 20 million dollars a year is being spent on leasing, exploration and drilling through this basin with a large part of the work in evaluating Mesaverde possibilities.

Mesaverde, long productive of gas throughout a large area of the San Juan Basin of northwestern New Mexico and southwestern Colorado, had not been considered particularly promising in the Green River Basin until discoveries were made in that formation within recent months. The formation is now considered of importance through a large portion of the basin. The discoveries have become of increased importance with the prospect of an additional gas pipe line outlet to the Pacific northwest, furnishing a market if sufficient reserves are proven.

The new Mesaverde discoveries have been confined thus far to the Trail and Middle Mountain areas, in southern Sweetwater County, and to the Big Piney area of southwestern Sublette County. At Trail Unit the Mesaverde produced gas at around 7,500 feet and the Middle Mountain discovery at a similar depth was a high gas-oil ratio producer. Data on the Mesaverde discovery at Big Piney have not been announced, but reportedly it made a sizeable volume of gas. Despite the concentration of drilling in these two areas at the present time, Mesaverde is the subject of study throughout the entire Green River Basin.

The Green River Basin consists of approximately 18,000 square miles in the southwest portion of Wyoming and a small area of northwestern Colorado. The name for the basin is derived from a principal feature, the Green River, flowing southward from the Wind River mountain range through the center of the basin, cutting the Uinta mountains of northeastern Utah to join the Colorado River in eastern Utah. High mountains surround the basin to the north, northeast, west and southwest, with the Continental Divide at the east. The basin is 140 miles at the widest point and approximately 170 miles in length. The majority

of the basin is Tertiary covered, with thick sedimentary beds, estimated as much as 60,000 feet at the deepest point.

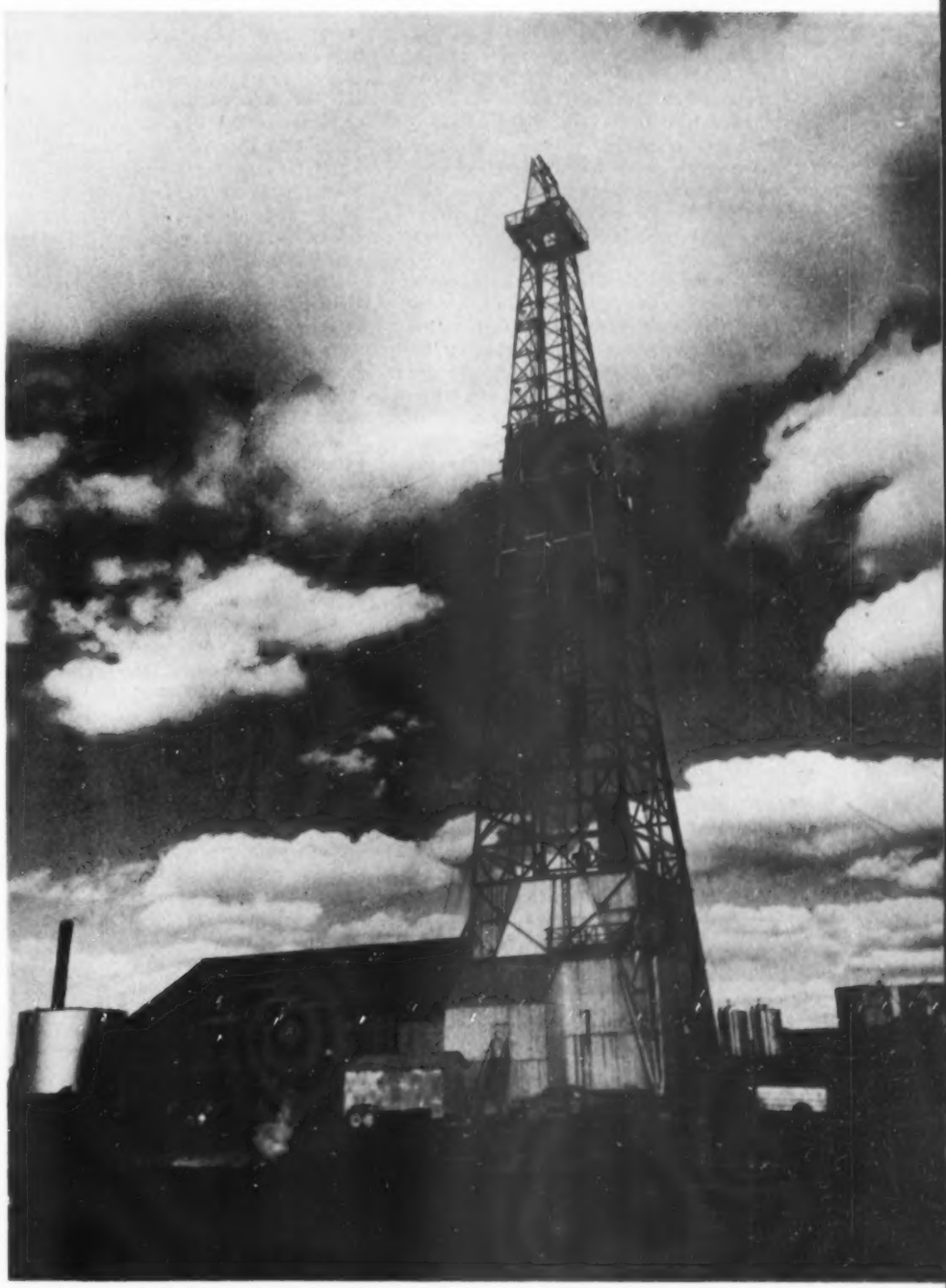
This basin, one of the largest in the entire Rocky Mountains, is an area of contrasts. The entire length of the west side consists of extensive overthrust beds, with complex geology. The central basin area has long, gentle dipping features with the Rock Springs uplift extending almost the complete length of the central area. Along the southwest side a series of faults, one as much as 120 miles in length with a throw of as much as 14,000 feet, line the north end of the Uinta mountains.

Oil has long been an important feature of the Green River Basin, since early pioneers crossing the Oregon Trail stopped at points on the southwest side of the basin and greased wagon axles for the continuing journey across the Wyoming Range and into the Great Salt Lake area. Records of oil seeps in the Kemmerer-Evanstown area show that they were known as early as 1834 and the Mormons made use of the oil in their trek across the area in 1847. In 1886 wells were drilled to depths of around 150 feet in the Aspen area, near Hilliard, in the NW quarter Section 4, Township 13N-119W, with the oil marketed for medicinal purposes and as lubricants. Small production from shallow depths is still obtained from wells in this general area.

The depth of formations normally producing through the balance of the Rocky Mountains has been a deterrent to exploration in the Green River Basin. During the early 1900's, when geologists were studying lower Cretaceous beds on the surface in the Powder River, Wind River, and Big Horn Basins, the Tertiary-covered Green River Basin had little interest from a geologic standpoint and the lower Cretaceous was at prohibitive depths for drilling. The world's deepest well, Superior Oil Company's Pacific Creek wildcat, along the northeast flank of the basin, was completed in 1950 at 20,521 feet as a lower Cretaceous sand failure.

Although sizeable oil and gas reserves are obtained from Eocene and upper Cretaceous beds in other oil areas of the nation, these formations have not been considered primary oil and gas producing zones in the Rocky Mountains. Lower Cretaceous and older beds formed the primary reservoirs for production in almost all early fields of this region. The exception to this rule was production along the west flank of the Green River Basin, at LaBarge field, and along the southern side at Powder Wash and Hiawatha fields. Lower Cretaceous production at greater depths throughout the Rocky Mountains

Superior Oil Company's Pacific Creek wildcat in Wyoming's Green River basin was abandoned at 20,521 feet total depth, the world's deepest well.



became of increased interest following discovery of gas below 12,000 feet at Church Buttes field, in the central Green River Basin, in 1946. Tertiary and upper Cretaceous production possibilities in other areas of the Rocky Mountains have still failed to attract important attention, although recognition of possibilities of the various sands of these zones has received prominence in the Green River area.

Pioneer in both development and wildcat activity in this basin has been Mountain Fuel Supply Company. The firm, in which the Ohio Oil Company has approximately one-quarter stock ownership, is active in production, pipe line and distribution of gas from the Green River Basin. The gas is supplied from the Hiawatha, Powder Wash, Clay Basin, Baxter Basin and Church Buttes fields, with distribution in the greater Salt Lake area. This company has led in geological and geophysical exploration, with a continuing wildcat program underway, and has as a result recently made two new pay gas discoveries, one Mesaverde discovery and a new Mesaverde discovery now near completion.

A number of new operators have joined in the exploration phase and this is now one of the most active areas in the entire Rocky Mountain region. Included in the sizeable group holding acreage in the basin and active in geophysical work are the California Company (Standard of California), Stanolind Oil & Gas Company, Carter Oil Company, Cities Service Oil Company, Sinclair Oil & Gas Company, Sun Oil Company, Union Oil Company of California, Continental Oil Company, General Petroleum Corporation, Gulf Oil Company, British-American Oil Producing Company, Hancock Oil Company, Phillips Petroleum Company, Seaboard Oil Company, Shell Oil Company, Sohio Petroleum Company, and others.

Most of the lands throughout this basin are public domain, with the result that solid optioning of leases is practiced, with frequent unitization of lands prior to drilling. Some units, such as Shell Oil Company's Shell Creek unit, cover as much as 50,000 acres or more. The Union Pacific Railroad Company has sizeable land grants through this area, retaining mineral rights on practically all lands within its grant area extending 20 miles each side of the railroad right-of-way. Union Pacific normally cooperates in oil and gas activities within its sphere of holdings. In some areas, such as that along the Green River, there are extensive fee lands with minerals retained by the land owners.

More than seven million acres of fee, federal and state lands are now leased in the Green River Basin, with additional leasing now under way. The largest holdings are in Sweetwater County, Wyoming, which covers 6,714,880 acres and where 2,578,151 acres are leased. This county is in the central basin area, split by the large Rock Springs uplift. Leasing around this uplift has been extensive, apparently based on the possibility of Tertiary and Mesaverde production. The Trail and Middle Mountain fields, where Mesaverde discoveries of oil and gas were made in 1952, are located along the south side of this uplift and just north of the Hiawatha and Powder Wash fields.

Leasing has not been so active in northeastern Sweetwater County, where Mesaverde is considered to be presently at excessive depth. This portion of the basin is also called the Red Desert Basin, with several deep tests to Cretaceous drilled along the north basin rim.

In the Washakie Basin portion of the Green River, in southeastern Sweetwater County, leasing has been particularly interesting in the past year due not to the Mesaverde possibilities (although a small gas discovery was found in that zone on the east flank of the Basin), but because of shows of Tensleep oil found in a wildcat in that area last year. Leasing is also heavy through the Colorado portion of the basin, in Moffat County, east and south of the Hiawatha-Powder Wash fields. A total of 2,219,738 acres was reported recently leased in that county.

On the west and southwest sides of the Green River Basin, leasing has been increasingly heavy during recent months. This is partially due to discoveries made in the Big Piney-LaBarge area, immediately east of the overthrust belt, in southwestern Sublette County. Arthur Belfer of New Jersey has inaugurated an extensive drilling program, proving gas reserves through a large area. As a result of this drilling, together with other original ideas concerning gas accumulation in an extensive portion of the western side of the basin, leasing in this area has surpassed that of any other general area in Wyoming recently.

Geophysical work, as well as leasing, has been active along the northeast flank of the basin, southwest of the Wind River mountains, on the old Pinedale Unit. Continental Oil Company and others are reported doing geophysical work throughout this area, with consideration of Mesaverde possibilities reportedly an important factor in the exploration.

More than six million dollars will be spent in geophysical work in the Green River Basin in 1953, on the basis of work done during the first half of this year. This is a sizeable increase over activity during 1952, which in turn was more than double that of the previous year. Again, the majority of the work is being done in Sweetwater County, with Sublette and Moffatt Counties exceeding the one million dollar per year expense rate for this work. Geophysics will continue to play an increasingly prominent part in evaluating leases held through this large basin area, due to Tertiary covering. Density of drilling is extremely low, with only one wildcat to each 187 square miles in Sweetwater County, for example, with the result that sub-surface data is sparse. However, possibility of production in Tertiary and upper Cretaceous has not been a matter of study until recently, with the result that logs of old wells are now being studied for gas and oil prospects in various areas of the basin.

Although the Baxter Basin fields, along the Rock Springs uplift, had production as early as 1922, the fields have been among the most disappointing in the basin. This was due to failure of deep drilling below the lower Cretaceous gas producing zones. Pennsylvanian (Tensleep-Weber) production was established in the Lost Soldier-Wertz fields immediately northeast of the Green River Basin, and at Rangely field, Colorado, south of the Green River Basin. However, Pennsylvanian failed to produce in several deep tests in the three producing Baxter Basin fields. These fields have produced more than 112 billion cubic feet of gas from the Frontier, Dakota, Lakota, Morrison and Nugget sands, with Mountain Fuel Supply as operator of the fields. A small amount of oil production was found in the North Baxter field, but the wells failed to develop commercial stature.

The first oil production from Tertiary in the entire Rocky Mountain region was found in the LaBarge area of southwestern Sublette County, along the overthrust belt in Townships 26N and 27N, Range 113W. The producing zone is in the Almy sand of basal Wasatch (Eocene) and discovery was made in 1924. The wells are in a producing zone around 650 feet deep, with more than 175 wells drilled in the field. Producing area along the anticline, which is closed by a fault to the west of the field, covers approximately 1,000 acres. The lensing sands of the Almy produce 20 to 40 degree API gravity oil. The field has produced more than 12 million barrels of oil and is still making approximately 1,000 barrels daily from the shallow Almy sands. The field attracted unusual notice when discovered, as Tertiary sands previously had been completely ignored in oil search throughout the Rocky Mountain states.

The second Tertiary production for the Rocky Mountains was also in the Green River Basin, when Mountain Fuel Supply made a gas discovery in the basal Wasatch sands in the Hiawatha field. Hiawatha is along the Vermillion Creek anticline, trending in an east-west direction along the Colorado-Wyoming state line. The major part of production is from the Wasatch, with lenticular sands at an average depth of 2,500 feet. The discovery well was completed in 1926 in the SWNE Section 22-12N-100W, Moffat County, Colorado. The well had an open flow of 45 million cubic feet of gas daily from a Wasatch sand at 2,220 feet. Initial flows of more than 60 million cubic feet daily were found in tests in this field. The east and west domes of the Hiawatha field have produced more than 60 billion cubic feet of gas since discovery, with reserves estimated at more than 100 billion from all formations remaining to be produced.

Wyoming Range from Deadline Ridge. Snyder Basin in foreground. In the thrust-faulted belt that forms the western limit of the Green River Basin. The Snyder Basin is being drilled by Standard of California.

In 1949, Mountain Fuel Supply made a Fort Union (Paleocene) discovery in the West Hiawatha field at a depth of 4,100 feet, augmenting gas reserves from the more shallow basal Wasatch sands.

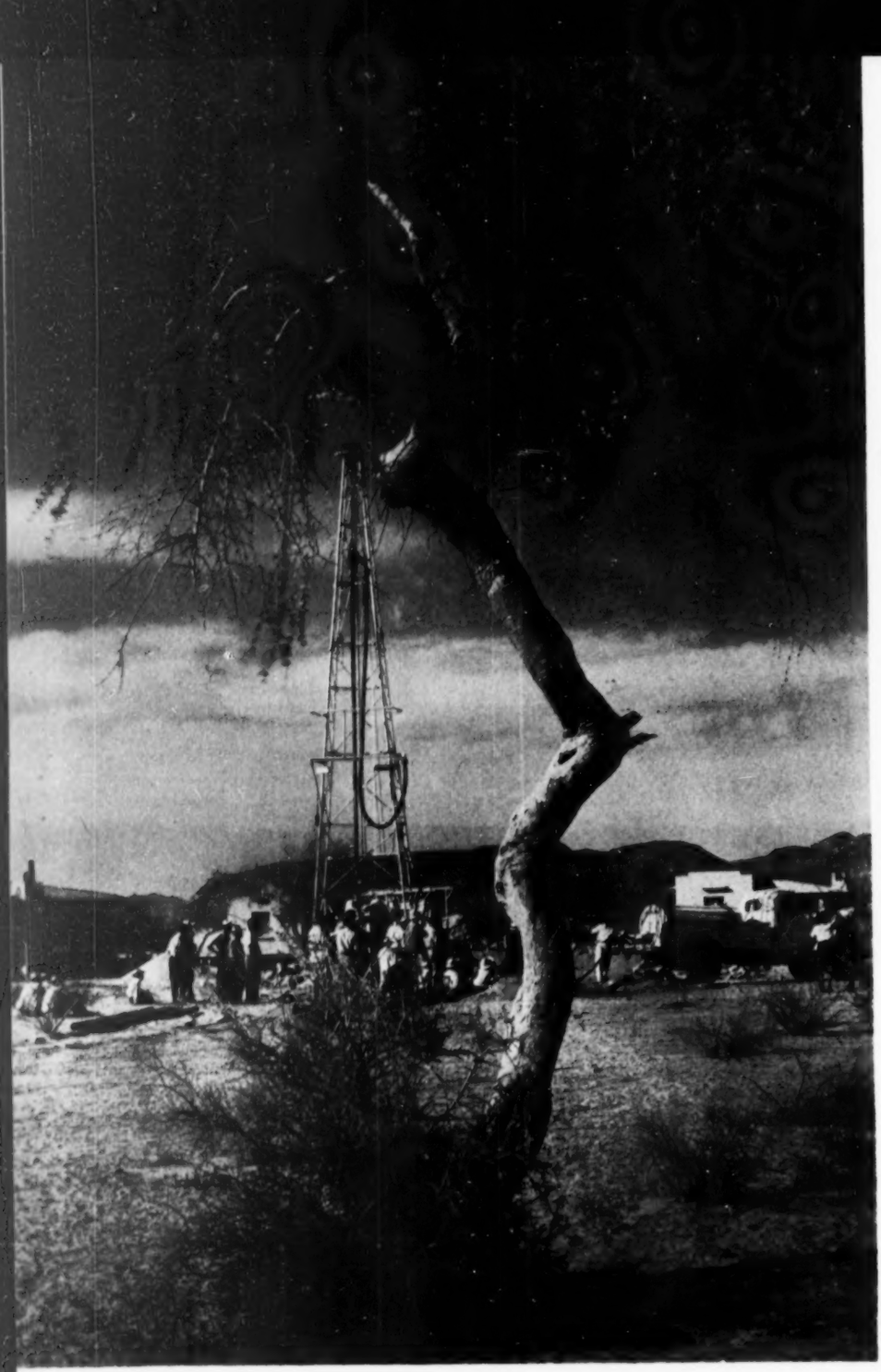
One of the most expensive tests to be drilled in the Green River Basin was the Mountain Fuel Supply 15,041 foot wildcat at #1 Unit, SE Lot 5, Section 14-12N-100W, which took 25 months to drill and was a failure in Nugget (Jurassic) at that depth. However, this wildcat was plugged back to 5,000 feet and completed as a Lance (upper Cretaceous) discovery for the field. The well had an initial of 9,120,000 cubic feet of gas daily from that zone. The company has completed a second Lance gas producer in the field, and is continuing the drilling development program for that zone.

Along the same anticlinal trend, and southeast of the Hiawatha field, Mountain Fuel Supply made a discovery in the Powder Wash area in 1931 with gas from the Wasatch. Well #1 Musser, C NE 5-11N-97W, Moffat County, Colorado, had an open flow of 34 million cubic feet of gas daily. In 1936, the company's #1 Carl Allen, NE SW SE 32-12N-97W, flowed 1,100 barrels of oil daily from the same zone. Production in this field, as at Hiawatha, is from lenticular sands of the basal Wasatch, with the result that both very large and comparatively small initial productions of oil and gas were found. Oil production dropped considerably following high initials, but the field has produced more than 900,000 barrels of oil and is currently producing approximately 700 barrels daily with an average of ten million cubic feet of gas daily from 25 wells. The wells producing the high gravity oil have very high gas-oil ratios, with the oil incidental to the gas production at the present time.

In April 1953, Mountain Fuel Supply drilled the first test below Fort Union in this field and found a gas discovery in the Lance formation at approximately 8,400 feet. The well had an initial flow of 8,770,000 cubic feet of gas daily. Mesaverde, at an estimated 1,000 feet below Lance, was not tested in this well. However, Mountain Fuel immediately started an exploratory drilling and development program for the Lance formation in the field and is presently testing #7 Carl Allen, SW NW SE 28-12N-97W,

(Please turn to page 124)

Victor Peak and Victor Lake in the Wind River Range along the northeast side of the Green River Basin. Granite core of the mountain uplift.



Failing rig drilling a new location in Mexico.

World-wide exploration attains record activity

MOST NOTEWORTHY feature of the oil industry's development during the past year has been the rapid expansion and diversification of activities throughout the world. A striking statistic among recent figures is the showing of crude oil production in countries other than the United States, which for the first time in the modern history of the industry, exceeded the American output during the second quarter of 1953. Reports for this three-month period indicate a world production of 12,842,000 barrels daily, of which 6,250,000 b/d, or 48.7 percent, are credited to the United States and 6,592,000, or 51.3 percent, to other countries.

It would be unsafe to draw too broad conclusions from this comparison however, since the shift was due to a drop of a quarter million barrels daily in American production along with a gain of 300,000 b/d in the yield of Middle East fields. For the year 1952, the United States was still producing an average of 6,643,000 b/d, or over 51 percent of the world's total.

It is true, however, that since the end of World War II in 1945, when the United States was producing 66 percent of the world's oil supply, the increase, both of production and consumption, has been greater proportionately (though not in actual volume) in other parts of the world than in the United States. By 1948 the American share in world production had dropped to 59 percent; in 1950 it was 52 percent and in 1952 a little over 51 percent.

This shift in relative position is one that has long been anticipated by students of the world situation. It has been accelerated during the past few years by two significant developments. One is the rapid growth in American consumption of petroleum products which has changed the United States from an exporter of oil and oil products to a net importer on balance. The other is the development of prolific new sources of supply in other parts of the world and a great expansion in exploration and development around the globe which has reached a new high point.

Protective coating of coal-tar enamel, fiber glass, and asbestos felt being applied in a single operation by coating and wrapping machine on Canada's Interprovincial pipe line.

Western Hemisphere

This activity is not confined to any one region. It extends to every continent and to both hemispheres. In the United States it is evidenced by the completion during the first six months of 1953 of a greater number of wells, both wildcats and development wells, than in any corresponding half-yearly period. Except in West Texas, the increase in drilling activity has been general, and it has been particularly noteworthy in the Rocky Mountain region, where the opening of new pipe lines and the prospective building of others offers better market connections.

Expansion of Canada's thriving oil industry continues. With publication of the official production figures for the western provinces, covering the first five months of the year, a preliminary total for the half year is placed at 31,893,411 barrels, an increase of about 7,000,000 barrels in comparison with the same period of 1952. Producing wells actually operated for the first six months of 1952 totalled 2,852 to compare with just over 4,000 at the close of the 1953 half year.

Oil production by provinces for the first six months of 1953, as indicated by preliminary figures, are as follows: Alberta, 30,266,615 barrels; Saskatchewan, 1,161,293; Manitoba, 211,586; Northwest Territories, 149,152; Ontario, 96,019; and New Brunswick, 8,746.

Exploratory drilling in Canada increased 81 percent in 1952 to a total of 879 wells, of which 27 percent were successful in finding oil or gas. Of the total, 641 were dry, 94 gas and 144 oil producers. New oil fields discovered totaled 77, gas 68, condensate one. Exploratory work found 68 oil field extensions, 24 gas extensions and one condensate. Success ratio on rank wildcats was 25 percent. Significant discoveries during the year totaled 30.

Drilling rigs at the end of the half year in Alberta totalled 152 to compare with 209 for the same period last year. Seismic parties, with a drop of 12 percent, numbered 114 to compare with last year's 209. Oil discoveries made in 1953 approximately equalled those of 1952. Gas discoveries in Alberta, however, showed a decline. With no decision yet appearing as to export markets for surplus gas, exploratory work in this branch of the industry has slackened temporarily.

Completion of the Trans Mountain pipe line from Edmonton to Vancouver will now be followed by filling of the line with Alberta oil. Steady transmission to Vancouver is expected some time in October. By the close of the year, the extension of the Interprovincial line to Sarnia, Ontario, is also expected. With these transportation facilities in operation, a further increase in production is expected.

A favorable decision on gas export is hoped for by the end of the current year. With this in hand, exploratory work should proceed with greater impetus as new markets for oil make their appearance.

Development of the Athabasca tar sands on a commercial basis will not become a reality for five to ten years, according to Dr. Karl A. Clark of the University of Alberta. Recently, provincial authorities rejected bids on the experimental Bitumont recovery plant. Several oil companies are studying the area with a view to possible future recovery operations.

Farther north in Alaska, testing is to be undertaken on a million acre block by Phillips Petroleum Co. and Kerr-McGee Oil Industries, Inc. A late development in this area is the signing of an agreement between the United States and Canada for construction of a 600-mile pipe line from Haines, an all weather port near Skagway, through northwestern British Columbia and Yukon territory to Fairbanks, Alaska. The line is a military project intended primarily to supply avgas to air bases in the northwest.

Both exploratory and development drilling is being stepped up in Mexico in an effort to keep ahead of the rapid rise in domestic consumption of petroleum. The program laid down for the current year contemplates the drilling of 400 wells compared with 307 completions in 1952 and 268 in 1951. Geological and geophysical reconnaissance work occupied 421 party months in 1952 compared with 387 in 1951. Footage drilled in 1952 aggregated 1,220,791 feet, an average of 3,976 feet per well, which is very close to the average well depth in the United States.

Of the 196 development wells drilled in 1952, 54 were dry, eight yielded gas and 134 were oil producers. The success ratio on development wells was 72.4 percent. Of the 111 wells classed as exploratory, 35 were producers, eight gas and 68 dry. In an effort to find new fields, Pemex drilled 29 holes, of which five were successful. Eighty-two were drilled to deeper horizons or as step-out tests to extend known fields. Extension exploratory drilling brought in 30 oil producers and seven gassers, and new field wildcats resulted in four producers and one gasser. Exploratory drilling was 38.7 percent successful.

Three of the four new oil fields discovered in 1952 are in the Tampico region. Of these, the Ezequiel Ordonez field is the most important. Discovery well was a gasser at 4,852 feet in the El Abra Middle Cretaceous limestone. The second well, drilling down structure, was brought in with 6,290 b/d of 22 gravity oil. Four succeeding wells tested an average initial of 8,600 b/d. The field is considered of great importance because of the thickness of the producing horizon and the fact that it extends the Golden Lane to an area which long had been disregarded.

Additional drilling in the Vera Cruz area this year has uncovered two additional fields which Pemex authorities class as important. They are at La Angostura and Santa Agueda. The latter find was reported to test 7,000 b/d initially.

Marine exploration is attracting attention in Trinidad where Trinidad Northern Areas Ltd. has obtained exploration rights over a large area in the Gulf of

Drill being set up for new shot-hole for Socony-Vacuum operations at Loon Lake, Alta

Production well in the newly-discovered Hemmelte oil field in Germany.

Rig being set for exploratory drilling to 8,000 feet in Italy. AGIP photo.

Paria with preparations being made for test drilling. Land exploration is being conducted in the central range reserve in the interior of the island. In the Caribbean, Gulf is continuing exploratory work. A deep dry test was drilled last year off the north coast of Cuba. Present work is confined to surface reconnaisance. A seismograph survey is in progress in British Honduras, where the company has a drilling obligation which must be undertaken by October 1954. First test well in Barbados is currently drilling at about 7,500 feet; projected depth is 10,000 feet.

Numerous developments in South America and details of progress in Venezuela are the subjects of articles appearing on other pages of this issue.

Eastern Hemisphere

It is in the Eastern Hemisphere that the most widespread and diversified activities in the search for oil and development of production are under way at the present time. This is a natural outcome of the decline in American exports and increasing dependence of the eastern world on its own sources of supply. From western Europe to the far reaches of the Pacific, determined efforts are being made to locate hitherto undiscovered deposits of oil or gas and to expand the output of known fields.

Aside from countries now behind the Iron Curtain, Europe never has been an important factor in oil production, but the combination of national ambitions and nearness to substantial markets has served to maintain interest in continued exploration. Encouraged by its success in developing the Lacq field at the foot of the Pyrenees which, with minor gains in older locations, has resulted in tripling the output from its continental area since 1948, France has embarked on a program of systematic exploration directed to a survey of its southern and southeastern portions and the Paris basin as well as its colonial holdings in Africa and elsewhere.

In line with the program set forth by the Bureau of Petroleum Research, the number of crews engaged in seismic surveys has been increased this year, and with the introduction of heavier drilling rigs, subsurface tests can be carried to greater depths in accordance with geological indications. Footage drilled in field tests is expected to double within the next year as compared with 1950.

Aside from the exploration conducted under the supervision of governmental agencies, private capital has shown an interest in joining the search for oil in France. As reported last year, Esso Standard Francaise, subsidiary of Standard Oil Co. (N. J.), obtained an exploration permit covering a large area lying south and east of Bordeaux and is now drilling a test, Meno 1, which has reached a depth below 7,000 feet.

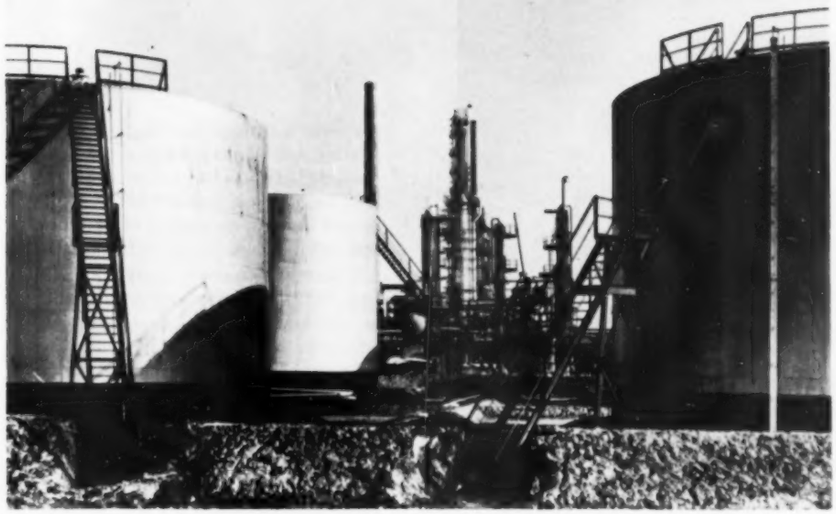
In late 1952 and early this year, a flurry of interest was created by the report that CEPSA, Spain's government directed oil company, in conjunction with outside capital, was planning to undertake surveys and later drilling in the northern part of the country to test the possibility that the same formations which had been found productive in France might extend underneath the mountains into Spain. Meanwhile, a well put down by an American syndicate was abandoned at 11,000 feet as dry, according to press reports.

Steady progress is being made in expansion of natural gas production in the Po Valley of Italy with current output approaching 200 million cubic feet daily and a growing system of pipe lines transporting it to the industrial cities of the northern states. While the development of this district is restricted to AGIP (Azienda Generale Italiana Petrole), which has 24 rigs working and recently added four purchased from the United States for deeper drilling, other companies representing a combination of Italian and outside capital are actively pushing exploration in other districts.

Particular attention is being directed at the present time to exploration in Sicily owing to a revision of the mining law which permits exploitation of petroleum deposits on a fixed royalty basis. Gulf Oil Co. has been active in Sicily and through a subsidiary, American International Fuel and Petroleum Co., is engaged in drilling a well in the Ragusa section which was reported to have reached a depth of over 3,400 feet at the beginning of August. Macmillian Petroleum Corp. holds an adjoining 30,000 acre concession, and in partnership with Gulf holds the 22,000-acre concession of Mediterranean Oil Co. According to a recent report, Gulf and the Montecatani Co., one of the largest corporations in Italy, have jointly organized the Societa Petrosud to explore two large concessions on the Adriatic coast. D'Arcy Exploration Co., drilling subsidiary of Anglo-Iranian Oil Co. Ltd., has been engaged for the past two years in geophysical surveys on its 70,000-acre holding in the island and has announced its intention of drilling a test well in the Vittoria district.

Through new discoveries and extensions of existing fields, Germany is adding steadily to its output of indigenous oil which is now approaching two million tons per annum and supplies 35 percent of the intake of the country's refineries. Particular interest during the current year has been directed to the upper Rhine Valley, where the bringing in of Rot 3, about 10 miles south of Heidelberg, in January last, has been followed by two additional wells, the first of which produced 75 barrels a day from about 2,000 feet, while the second is still drilling. Other encouraging showings have been made in wells drilled both to the north and south. Extensions of the Hannover and Emsland fields have contributed to the expansion of producing areas. The encouraging feature of German exploration during the past two years has been the location of deposits in areas not previously tested or in which no oil had been discovered in earlier wildcatting with shallow equipment.

Holland's small but highly prized Schoenbeck field continues to provide a substantial part of the country's refining



Storage tanks with cracking towers in background at newly-opened plant of Esso Standard S. A. on banks of Scheldt River, Antwerp, Belgium.

needs. Exploration in other sections has revealed showings of gas and oil, but thus far no commercial production.

According to a recent press report, Shell has made application to the government of Belgium for a concession to prospect for oil and gas in an area of 107,500 hectares in the provinces of Antwerp and Limbourg along the Dutch frontier. In Denmark, Gulf Oil Co. is continuing its quest for oil by drilling Rodby No. 2, on the island of Lolland, which was at 6,340 feet late in August.

Anglo-Iranian Oil Co. Ltd., through its subsidiary, D'Arcy Exploration Co., is pushing exploration in the United Kingdom (where its production reached 45,100 tons in 1952) by drilling a well near the center of the Isle of Wight. Preparations are under way for a second wildcat to be put down at Screveton in Nottinghamshire.

Elsewhere in free Europe, a report from Greece states that the government has been approached by representatives of the late William Helis with a proposal for an exploratory permit. Several years ago, Mr. Helis, a native of Greece, obtained a concession and made arrangements to move in drilling equipment, a project which was thwarted by the war, but which may now be resumed. In Austria, where a growing oil output has been taken by Russia for the past several years, a test well is being put down in the extreme south of the country outside the zone of Russian occupation.

From the Soviet Union and the circle of countries it controls, little exact information is available; official statements indicate that a substantial increase in production has taken place during the past year with new fields coming into production.

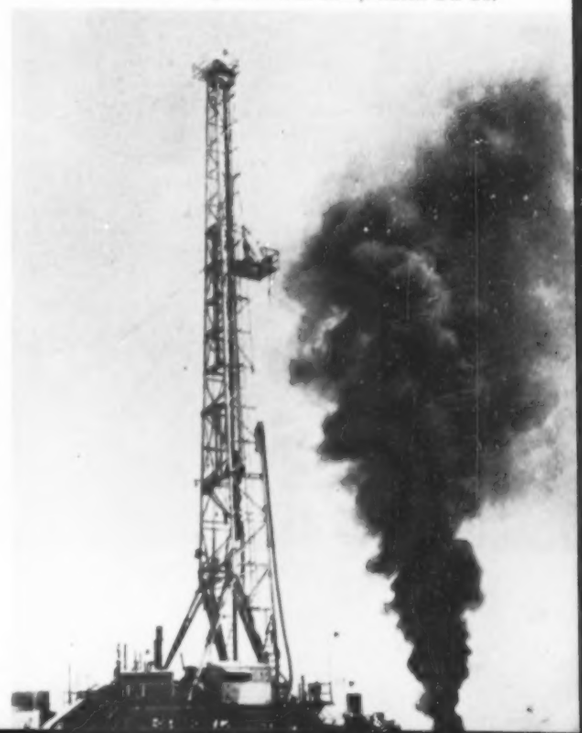
Sporadic exploration on the continent of Africa has been carried on from time to time for many years past and the oil industry of Egypt has been in existence since early in the century. From the close of World War II, a program of oil search, under guidance of BRP (Bureau des Recherches du Petrole of France), has been carried on with the objective of completing a thorough study of the 1,250,000 square miles of sedimentary lands lying along the coast of northern Africa from Morocco to Tunisia. The work has involved a heavy expenditure, but is considered worth while as it has led to a production of 100,000 tons per year in Morocco, with smaller production and encouraging prospects in Algeria and Tunisia. Other French-controlled territories in Africa in which exploration has been undertaken are: Madagascar, Gabon and the Cameroons, Equatorial Africa, and west coast areas including Senegal, the Ivory Coast and Dahomey. Extension of operations to portions of the Sahara desert is considered the next step to be taken.

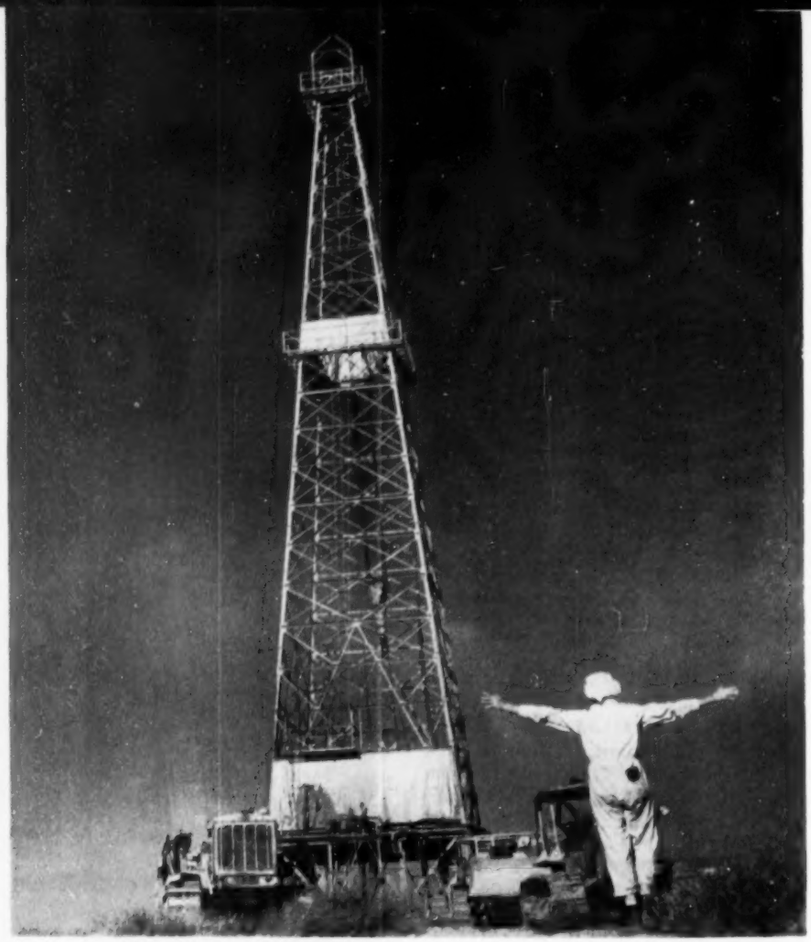
As matters stand, exploration in the northern areas is in the hands of a combination of French interests represented by SNREPAL and international companies. SNRP and Cie. Francaise des Petroles have Tunisian concessions covering 90,000 square miles, while further south, another block of 93,000 square miles is held by the Royal Dutch/Shell group in combination with French interests, and in Tunisia proper a large area is held by Gulf Oil Co. along with the French company SNREPT.

In Egypt, where interest in exploration has been at low ebb during the past few years on account of the onerous requirements of the Egyptian mining law, the level of production has been barely maintained while the output of the country's older fields shows a declining trend. Anglo-Egyptian Oil Fields, in conjunction with Socony-Vacuum, operates two fields, Asl and Sudr, on the Sinai peninsula, with an output of about 22,000 b/d, but only one well was drilled last year and the fields are approaching commercial exhaustion. One rig is kept busy in the older Ras Gharib field completing six additional wells per year. On December 31 last, there were 111 wells in operation producing 22,900 b/d compared with

Drilling on the Isle of Wight, a phase of the D'Arcy Exploration Company's search for oil in the United Kingdom.

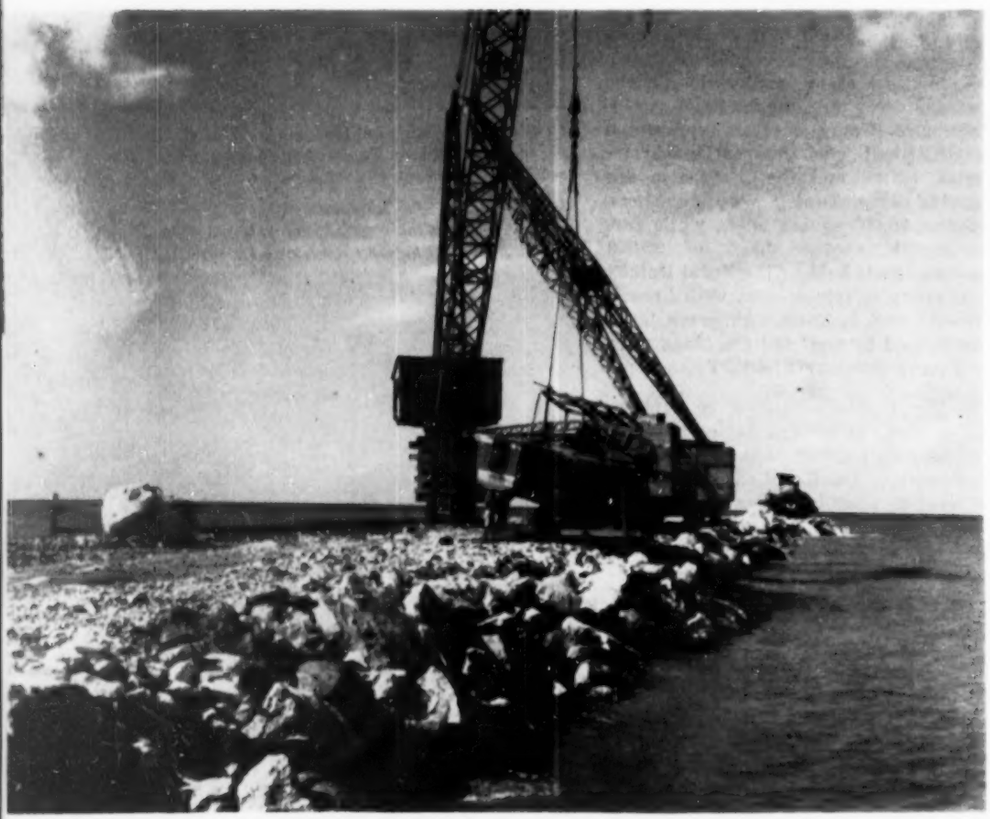
U-15 Unit Rig after completion of Wafra No. 4 in the neutral zone between Kuwait and Saudi Arabia. Photo by American Independent Oil Co.





Skidding derrick to a new location in the Burgan field in Kuwait.

Construction work at Banias, Mediterranean terminal of Iraq Petroleum Company's big pipe line.



106 wells producing 21,420 b/d a year earlier. While the mining law has been amended to remove some of the provisions discouraging exploration, no action has been taken on applications which have been pending for months.

There have been reports meanwhile of negotiations by various interests looking to a renewal of active exploration, and one newcomer has undertaken a definite program. The International Egyptian Oil Co., Inc., controlled by a Swiss banking syndicate, has employed Southern California Petroleum Corp., which is participating in the project, to supervise operations. United Geophysical Co. is to conduct a survey of certain areas on the Sinai peninsula. The company has purchased properties and equipment of Standard Oil Co. of Egypt, which has been inactive since 1949 when the company became dissatisfied with regulations imposed by the government. Included in the properties obtained is the wildcat discovery at Wadi Feiran on the Sinai peninsula which was shut in after completion.

Sinclair Oil Co. is continuing its test drilling in Ethiopia and has broadened the scope of its operations by organizing the Sinclair Somal Corp. through which, jointly with the Conorada Co., representing the Continental, Ohio and Amerada companies, it is to explore an area comprising approximately half of former Italian Somaliland, which adjoins Ethiopia and extends eastward to the Gulf of Aden. Extension of exploration to British Somaliland is being considered.

Shell and Anglo-Iranian are operating jointly in exploration work in Nigeria. Following extensive geophysical surveys, the first deep test was completed without finding production. Two more wells are now drilling. One of these is a deep test at Akata, which is now below 8,000 feet. The second, a shallower well, is being put down at Amansiodo. The same combination of interests has obtained concessions in Tanganyika and Zanzibar, where geological and geophysical exploration, including an aeromagnetic survey, is in progress. Proposals for exploration in Kenya and possible erection of a refinery there have been reported. In Mozambique, Gulf recently completed its first test, Domo 1, near Imbhame, abandoned at 10,455 feet, and has a second test, Zandamela 1, now down about 7,000 feet. Elsewhere in Africa, preliminary work has been started in the Belgian Congo and on the Gold Coast in the west. It is too early to assess the result of all these efforts, but together they constitute the most comprehensive program ever undertaken in Africa.

In the Middle East, development of established fields is proceeding in an orderly manner. In Saudi Arabia, Arabian American Oil Co. drilled 39 wells in 1952 of which 33 were in the Ghawar field. In the first half of the current year

six rigs have been busy drilling development wells. On June 30, the company was operating 138 oil and three gas wells in four fields. Twelve wells were shut in, 55 were standing and ten were being used as observation wells. Of the 235 drilled thus far, 17 have been abandoned during drilling or after completion.

Aramco is continuing active reconnaissance work. At the end of 1952, three field parties were engaged in mapping, two in triangulation and leveling, three in gravity meter and magnetometer work, two in seismograph surveys and three in structure drilling with seven light rigs.

A field of rising importance on the Arabian peninsula is Qatar, where the discovery well was brought in by Petroleum Development (Qatar) Ltd. in 1940. The outbreak of war caused work to be suspended until 1947, since which time 32 wells have been drilled and production has grown to upward of 3,000,000 tons per year. Heretofore, all production has come from the Dukhan field, but structural drilling is now proceeding at Al Kharib, where seismic surveys located an anticlinal structure of considerable extent. The first test well, Al Kharib 1, was started in November 1952.

Off the Trucial Coast of Arabia, in the Persian Gulf, a concession over the continental shelf area subject to the ruler of Abu Dhabi was acquired in March of this year by D'Arcy Exploration Co. The area of the concession, which formerly was held by Superior Oil Co., exceeds 12,000 square miles. The term of the contract is 65 years and covers rights to produce, export and refine oil. There is an obligation to commence exploration within one year of signature and to drill within five years if a suitable location can be found.

A similar concession over the continental shelf area subject to the ruler of Dubai was signed by George Heseldin, general manager of Petroleum Development (Qatar) Ltd. in August 1952 on behalf of D'Arcy Exploration Co. and the Compagnie Francaise des Petroles. A company has been formed to develop the concession. The area is 1,300 square miles and the duration is 60 years.

A preliminary geological reconnaissance of the province of Dhofar in the Sultanate of Muscat and Oman, Southern Arabia, with a view to possible later exploration in search of new sources of oil, was completed recently by a group of oil experts representing Cities Service and the Richfield Oil Corp.

These companies hold an option on an oil concession covering Dhofar, approximately 30,000 square miles, granted to the Philpryor Corp. by Sultan Said bin Taimur, Sultan of Muscat and Oman. It is planned to send a second geological party into the area during the Fall. The

(Please turn to page 110)

First delivery of rigs with which drilling operations are to be undertaken in Israel.

Tanker loading at Fao Terminal, southeast of Basrah, in Iraq, on the Shatt-al-Arab River, new shipping point for oil from southern Iraq.

Construction camp near Aden, Arabia, on site selected by Anglo-Iranian Oil Co. as strategic point for shipment of products to the East or West.

Synthetic fuels in East Germany

By George Rosu

THE GERMAN synthetic fuels industry reached its apex in 1943 with an output of 28.3 million barrels. In that year the productive capacity in working condition totalled 37.9 million barrels and plans were under way to expand it by an additional 15.8 million barrels for which purpose supplementary subterranean installations were in progress of construction. If the course of the war and the USA-British air raids had not stopped this expansion, Germany might have produced, by 1946 or 1947, approximately 53.7 million barrels or 147,000 b/d of synthetic fuels and thus have exceeded the level of self-sufficiency required even by exacting war economy.

TABLE I

Territory presently belonging to:	Process	No. of Plants	Capacity b/d Partial	Capacity b/d Cumulative
Western Germany	Bergius	4	20,000	
	Fischer-T.	6	15,000	35,000
Eastern Germany	Bergius	6	44,800	
	Fischer-T.	2	10,200	55,000
Poland (a)	Bergius	3	3,470	
	Fischer-T.	1	2,200	5,670
Czechoslovakia	Bergius	1	8,160	8,160
Total				103,830

(a) Including the two Blechhammer hydrogenation plants. Further details in text.

TABLE II

EAST GERMAN SYNTHETIC FUELS PLANT CAPACITIES

Plants	Builder	Location	Status*	Raw material used	Capacity b/d
Bergius Process					
Troeglitz	Brabag	Troeglitz nr. Zeitz	SAG	Lignite Tar	6,500
Boehlen-Rotha	Brabag	Boehlen, nr. Leipzig	VEB	Lignite Tar	6,200
Leuna Werke	I. G. Farben	nr. Merseburg	SAG	Lignite Tar	6,200
Luetzkendorf-Muecheln	Winter-shall	Krumpa im Geiseltal	VEB	Lignite	2,650
				Total	21,550
Fischer-Tropsch Process					
Ruhland	Brabag	Schwarzheide-Niederlausitz	SAG		2,040
Luetzkendorf-Muecheln	Winter-shall	Krumpa im Geiseltal	VEB		1,230
				Total	3,270
Special Plants					
Chemiewerk Buna	I. G. Farben	Schkopau, nr. Merseburg	SAG		30
				Grand Total	24,850

*SAG means Sowjet Aktiengesellschaft (Soviet Co. Ltd.), e.g. an enterprise owned and managed entirely by the specialized Soviet trusts.

VEB means Volkseigen Betrieb (People's Enterprise), i.e. socialized, and is managed by the German State Holding Co., the VVB (Verein Volkseigenen Betriebe).

TABLE III

LOW-TEMPERATURE CARBONIZATION PLANTS

Plant	Location	Status	Theoretical capacity of crude oils & gasoline b/d
Mineraloelwerk der Deutschen Erdoel AG.	Rositz, nr. Altenburg	VEB	1,630
Kohlenveredelung und Schwelwerke AG.	Goelzau, nr. Bitterfeld	VEB	1,220
Riebeck'sche Montanwerke AG.	Webau	VEB	820
AG. der Saechsischen Werke	Espenhain nr. Leipzig	SAG	n.a.

The geographical distribution of the plants was directed by strategic as well as economic factors. Among the latter were availability of coal and labor force. In eastern Germany, Czechoslovakia and Poland (the latter two, of course, after 1939) manpower was more abundant and the well-nigh inexhaustible lignite deposits provided cheaper raw material and thermo-electric energy than in western Germany. Consequently, the majority of the plants were located in those three territories (See Table I).

The plant capacity which remained within the frontiers of the present Soviet zone of Germany has undergone, since 1944, a series of transformations affecting both volume and quality.

The Poelitz hydrogenation plant, the capacity of which was equalled only by that of the Leuna works, was badly damaged by Allied air raids: probably not more than one third of the machines were salvaged. After almost one and one half years of planning to repair it, the Russians eventually removed the usable machines and cleared the area of scrap. The adjacent paste preparation plant presumably has met the same fate as the main plant. Its 260,000 tons tankage capacity has been either destroyed or removed. The only traces of the Poelitz plant, located in the German territory presently incorporated into Poland, are the subterranean installations.

The 5,000 b/d Magdeburg hydrogenation plant, located at Rothensee, including what survived from its 30,000 tons of tankage and the remnants of a new 1,000 b/d still under construction in 1944, have been dismantled and sent to Russia. The larger (5,000 b/d) of the two Ruhland Schwarz-Heide gas-synthesis plants was dismantled and offered to Poland by Russia in compensation for war damages. However, what the Poles carried away in 1947 amounted to less than half of the initial plant equipment.

Finally, the two hydrogenation plants located a few miles east and southeast of Cossel, on the banks of the Klodnitz Canal, the Blechhammer North and the Blechhammer South, were incorporated into Poland in 1945 along with the respective parts of German Lower Silesia. The former's production capacity amounted to 1,000 b/d and the latter's to something over 2,000 b/d. The installations, however, were badly damaged by war action and subsequently stripped by the Russians.

The capacity of those plants which remained in the present territory of the Soviet zone of Germany has been altered in many respects. Air raids and war actions repeatedly damaged the Leuna works and the Luetzkendorf-Meucheln gas-synthesis plant. Subsequently, Leuna and Ruhland works were severally dismantled by the Russians. Both plants were on the list of those works which were slated for total dismantlement. It was only in January 1947 that the Rus-

sians decided not to remove them to Russia.

After repeated repairs, the present capacity of the East German synthetic fuels plants is that shown in Table II. The activity and production of both categories of enterprises are included in the East German five year plan. Hence, their output is reflected in the set production targets as well as in the quarterly and annual results officially published.

However, the basic difference between them consists in the fact that, although the raw materials, electric power, transportation capacity, labor force, and even specific financial means needed by the SAGs are taken from, or contributed by, the Soviet zone's reserves and budget, their production belongs entirely to the Soviet government. The SAGs enjoy an extraterritorial status and are exempt from all taxes and dues.

In turn, the VEB's production does not necessarily belong to the East German economy. Actually, it is disposed of by the Soviet government as well, either through foreign trade channels, through reparations requirements, or through allocation to Soviet troops stationed in Eastern Germany.

Concerning the individual plants, the following may be added about their current activities:

The Troeglitz unit is located 3½ miles northeast of Zeitz. It draws the needed raw material from several paste preparation plants located within a radius of 10 miles. In 1944, additional stills were under construction. It may be presumed that the construction site has been prepared for a possible future expansion of this unit's capacity. Two thirds of Troeglitz's output is diesel oil. It also produces synthetic lubricants.

The Boehlen-Rotha plant, currently known as the Otto Grotewohl Kombinat, is located seven miles south of Leipzig and adjacent to the Saxonian lignite mines and to a thermo-electric plant. It also includes a paste preparation unit and a briquette factory. Until very recently the Boehlen-Rotha was an SAG; this is one of the 66 plants allegedly handed over to the East German government by the Soviet on the basis of an agreement of June 3, 1952. Currently, 90 percent of its production is gasoline. Boehlen-Rotha is the only plant in Eastern Germany producing aviation gasoline. The daily rate of approximately 2,000 barrels is being shipped to Russia. Since the end of 1950 this plant has also produced jet motor fuel (on a gasoline basis) at a daily rate of some 500 barrels. It is officially claimed that Boehlen-Rotha is the best organized synthetic fuel plant in the Soviet zone. Its staff is approximately 13,000 strong.

The Leuna works, now known as the Walter Ulbricht Werke, are located near Merseburg, on the banks of the Saale River. Its present capacity amounts to only half that of the 1943 peak year. It includes a paste preparation plant. Currently, 65 percent of its output is gasoline. Since 1947, the production of lubricants has been at times suspended or reduced in order to increase the production of fertilizers, of which approximately 130,000 tons of nitrogen and 400,000 tons of ammonium sulfate are being produced annually. The labor force currently employed at Leuna numbers about 25,000. According to unconfirmed news reports, this plant was damaged during the riotings of June 17.

Luetzkendorf-Muecheln, located between Krumpa and Geisel-Ruelitz, is an important chemical center which includes a Bergius and Fischer-Tropsch plant, and is serviced by a spacious storage capacity. The Bergius unit was originally designed for the hydrogenation of petroleum residues, but subsequently was used for lignite hydrogenation. Since 1950, however, its entire capacity has been used only for processing Austrian crude which Eastern Germany presently imports at a rate of over two million barrels a year. This unit has been completed recently with apparatus for producing turbine lubricants which it is claimed will render the Soviet zone independent of imports from the west before the end of the current year. Meanwhile, the zone's needs for lubricants are satisfied mainly by products derived from processed crude oil, polymerization of ethyls (Buna oil) and regenerated oils. It has been planned to complete this unit by 1955 with a tetraethyl lead installation to raise the octane rating of the produced gasoline. Since 1950, the chemical plant at Kettlitz-Freital has been attached, for technical and administrative purposes, to the Luetzkendorf-Muecheln complex. At the same time, this chemical complex has been separated from VVB and attached, as an independent unit, to the main division for chemistry of the Ministry for Heavy Industry. This chemical center's current staff exceeds 6,000 persons.

The Ruhland gas-synthesis plant is located one mile north of Schwarze Alster. This is the smaller of the two units built on this site. It was damaged during the war and partly dismantled, but soon afterwards was repaired and restored to operation. It currently employs approximately 5,000 people.

The Buna works are located at Schkopau, near Merseburg. The plant came out of the last war practically undamaged. The plant produces, in the main, synthetic rubber, but also smaller quantities of lubricating oils and brake fluid. The present gasoline capacity may be rated at 30 b/d. Since the end of 1950, the Buna works have also produced nitropendan (jet fuel on a nitrogen basis) on a reduced scale.

At the end of 1943, in the present territory of the Soviet zone, were located 18 tar preparation plants with a cumulative capacity of approximately 1.1 million tons per year. Almost all of them escaped from the war without major damages. (See Table III which lists additional low-temperature carbonization plants).

The following are the essential data about the tar distillation plants in the Soviet zone. The last figure indicates the theoretical (hypothetical maximum) production capacity for light and middle oils:

BROWN COAL TAR DISTILLERIES

Plant	*Location*	*Status*	*Capacity bbls/day*
Anhaltische Kohlenwerke A.G.	Roesseln-Koepsen	VEB	700
Grube Leopold A.G.	Edderitz	SAG	100
Grube Leopold A.G.	Boesdorf, nr. Leipzig	VEB	100

BLACK COAL TAR DISTILLERIES

Montanwax-fabrik der Ruetswerke A.G.	Erkner, nr. Berlin	VEB	60

The present capacity of all these plants is less than half of their 1943 peak capacity (470,000 tons/year). The Rositz and Espenhain plants suffered most seriously from war damage and dismantlement.

The zone's most important montanwax plants are those located at Wansleben and Amsdorf, to which may be added the Voelpke wax refinery. Since early 1952, the latter produced also a hard glossy wax from montanwax, meant mainly for export. However, only a very small quantity of this item is exported to the West. Before the last war, all the lignite montanwax consumed in USA and Great Britain came from Eastern Germany. The Voelpke plant started recently producing also montanic acid from raw montanwax.

An instructive comparison may be made in connection with the lignite and synthetic output against the background of past performances. This is the manner in which these two items have evolved in the Soviet Zone since 1938:

PRODUCTION *

Year	*Synthetic fuels (Gasoline & diesel oil) bbls/year*	*Index*	*Lignite Mill.m. tons/year*	*Index*
1938	4,916,500	100	123	100
1940	8,665,100	176	n.a.	...
1943	10,950,000	223	165	134
1945	1,005,600	20	85	69
1947	2,555,000	52	101	82
1949	5,959,000	121	124	100
1950	6,490,000	132	137	111
1951	8,074,500	164	147	120
1952	8,881,950	180	157	128

* Figures computed on the basis of official data.

The current planning obviously reflects, on the one hand, the Soviet pressure for a higher production and on the other an increase in plant capacity. According to an official source,[1] the targets for 1953 provide for a total production of 12,327,300 barrels of liquid fuels, including 7,387,200 barrels of gasoline and 4,940,000 barrels of diesel oil.

[1] Article by the Soviet Zone's Minister of Chemical and Allied Industries, published in DIE WIRTSCHAFT, Berlin, January 2, 1953.

The first set of targets, already revised upward in November 1951, provided for a total output of 11,625,000 barrels. Hence, the 1955 level should be surpassed during the current year. On the basis of available official percentages, the new goals (actually, the third set of targets) for 1955 would be:

Gasoline	8,341,200 barrels
Diesel oil	5,158,300 "
Total	13,499,500 "

This means an average of 37,000 b/d. The theoretical plant capacity available early in 1952 (including that of the subsidiary plants) amounted to 29,500 b/d, less the capacity of the Luetzkendorf-Muecheln hydrogenation plant, reserved for processing Austrian crude oil, amounting to 2,650 b/d. This gives a shortage of 10,150 b/d. Hence, the present capacity must be increased by a third in order to meet the revised targets for 1955. There is, so far, no official indication as to whether, what and where additional plant capacity will be built.

A modest share of the planned output for 1953 may come from a more intensive use of the available plant capacity (three-shift system, holiday work, and rationalization processes). An additional fraction may come from a rather modest expansion of the Leuna works which is claimed to be under way. This assertion seems in line with the high targets set for the output of benzene, toluene and naphthalene (from seven to 13 times higher than in 1950) set for this plant for 1955. Such a scheme would benefit from the available larger subterranean installations and the water and energy resources initially built for a larger structure. Leuna is located on the vast middle Germany lignite deposits and is a large chemical center, a fact which would simplify some investment problems.

There is, however, another development which might answer the inquiry about the required expansion of synthetic fuels plant capacity for meeting the ambitious 1955 targets.

The East German government claims to have developed, for industrial purposes, a process invented by Dr. Bilkenroth for producing metallurgical coke from lignite through a double chemical process. The construction of a coking plant based upon this invention was started early in 1951 at Lauchhammer, known as the Lauchhammer Grosskokerei. In addition to the main coking installations, based upon the low-temperature carbonization process, the structure includes three briquette plants, a power generating plant and several by-product works. The plant was opened in mid-1952 and the coke output amounted to 300,000 tons for that year. The target set for 1953 is 1.3 million tons of coke. When finished in 1955, the coking plant will have 96 ovens and its theoretical capacity will reach approximately two million tons/year. It seems, however, that the continual breakdowns occurring will cut the coke output in 1953 to almost half of the planned target.

The Lauchhammer village is an extension of the Schwarzheide-Niederlausitz, the site of the existing Ruhland plant. As mentioned above, a second Fischer-Tropsch, 5,000 b/d plant located here was removed to Poland in 1946. It is presumed that the subterranean installations and water resources, as initially built for both fuel plants, are still available. Yet, if it were not meant to expand the synthetic fuels production capacity of the Schwarzheide center, the location of the Lauchhammer coking plant would be a rather strange choice. Indeed, the nearest coke-consuming siderurgical center, the Huettenkombinat Ost, is located 60 miles northeast of Lauchhammer, at Fuerstenberg on the Oder. The second iron and steel center, Eisenwerke West, is located at Calbe, at an even greater distance westward.

It is an established fact that the combination of a Fischer-Tropsch plant and a coking plant is well-nigh ideal. The dry gas released by the Fischer-Tropsch process has a high heating value which can be best used for heating coke ovens. In turn, the coke oven gas released by a coking plant is the raw material used by a gas-synthesis process. The reaction heat resulting from the Fischer-Tropsch contact ovens (which in a single-standing gas-synthesis process is useless and even embarrassing) can also be very profitably used to produce the heating steam needed by a coking plant.

Therefore, it may be assumed that the Lauchhammer coking plant is nothing else than the consequence of the expansion of the Schwarzheide-Niederlausitz gas-synthesis center, and an economic integration undoubtedly has been dictated by investment problems. In addition to the existing subterranean installations and the water and energy sources, which are vital elements for a gas-synthesis process, the expanded Ruhland plant may use the existing purification pilot plant for the selective removal of the organic sulfur compounds from the raw synthesis gas as well as the existing cooling unit. This integration results, of course, in lower production costs for both synthetic fuels and coke. In view of the uneconomically high costs in Eastern Germany, this is a very desirable achievement.

The plant capacity seems, therefore, to be no longer an obstacle in the way of fulfilling the ambitious targets set for the production of synthetic fuels in 1955. There are, however, several other genuine obstacles which cannot be done away with easily. It is a known fact that all satellite economies are compelled by the Soviet time-tables to work under strenuous conditions as well as to struggle with great shortages and narrowing technical limitations. The special steel needed for the upkeep of the synthetic fuels plants will remain a constant headache. The Soviet zone's output of crude steel may reach, during the current year, a record figure of 2.4 million tons. Compared with future needs of the zone's economy (upkeep of the badly damaged and hurriedly patched-up industrial plants, for additional transportation facilities, for constructing mining equipment and new siderurgical and metallurgical plant), this quantity is insufficient. Moreover, this steel as well as the available steel-strengthening alloys must serve, in the first place, for satisfying the exacting Soviet reparations and the obligatory export lists.

Another serious obstacle is the Soviet zone's technical difficulties in producing the highly specialized equipment required for the maintenance, principally, of the gas-synthesis plants. With the exception of a handful of subcontractors, none of their factories are located in Eastern Germany. Since the drastic curbing of western exports of strategic goods to the Soviet orbit, these sources, located in Western Germany, cannot supply the Soviet zone with machines. Within the orbit itself, only the specialized Skoda Works at Pilsen can produce such equipment, but the Czech industry is overburdened with Soviet orders for years to come. Hence, most of the special machines must be produced by the inadequately tooled East German workshops. This results in higher costs and lower quality.

The zone's energy supplies are almost entirely thermo-electric, and thus expensive for the production of synthetic fuels. During the current year, the energy output may surpass 23 billion kwh, but the present power cuts enforced upon the industry itself, not to mention the civilian consumption, mirror a serious shortage.

Another bottleneck is the lignite raw material. The zone's ultimate lignite reserves may amount to 30 billion tons. However, due to the present manpower shortage and the thorough dismantlement of mining equipment operated by the Russians in 1945/46, the increase in lignite output is a difficult undertaking. Although the present output is still below the 1943 peak, more lignite is needed today in Eastern Germany than ever before. Chemical factories, metallurgical industries and locomotives had to switch from hard coal and mine coke to lignite burning and gas coke. The power plants consume today one third more lignite than in 1938 for the generation of the same volume of energy.

Briefly, the planned increase in liquid fuels output reveals shortages and bottlenecks in many sectors. In order to bring up to, and then constantly maintain, all the related sectors at the required economic and technical levels, the Soviet zone must make very substantial investments. The accumulation of these investment funds will remain the biggest problem of the East German synthetic fuels industry.

OIL ACTIVITY IN SOUTH AMERICA

Enactment of a new oil law has increased interest in Peru while some other countries are retarded by government policies and state monopolies.

International Petroleum Company's Totumal No. 1 Cretaceous discovery in Colombia which has stimulated a drilling campaign by Intercol in the Magdalena Valley.

By Dr. J. E. Rassmuss

OIL DEVELOPMENT in South America is still retarded in many countries by government policies. In Brazil, the largest in area and the second biggest consumer in South America, with a demand for 46 million barrels yearly, the oil law creating a new government enterprise for the development of oil is still under discussion in the Congress, and some amendments have been introduced, but the prevailing nationalistic tendency does not encourage foreign interest. The Conselho Nacional de Petroleo, with a budget of over $31 million for 1953, is continuing geological and geophysical research, mostly by American contractors. Fifteen rigs of Drilling and Exploration Co. of Los Angeles are employed. Except for extension of the Bahia fields, no new fields have been discovered so far, and oil imports, amounting to about $250 million yearly, are a heavy burden on the trade balance and increase the dollar scarcity. Output of the Bahia wells was 726,466 barrels last year, somewhat less than the preceding year. Production from January to April of 1953 was 320,980 barrels from around 200 producing wells.

In Argentina, crude oil production rose slightly from 24.4 million barrels in 1951 to 24.6 million in 1952, but the domestic demand is estimated to have increased for the same year to 72 million barrels, or three times the domestic production. Bilateral barter agreements with Great Britain, Venezuela and Peru have been concluded, and recently such an agreement with Russia for the importation of 500,000 tons of crude and also of Russian drilling equipment was reported to be under negotiation. Production has increased in Mendoza and Neuquen, where a new field has been developed, but has declined in Comodoro Rivadavia and Salta.

In Chile the development of the Magellanes fields by the Empresa Nacional de Petroleo shows steady progress. Production in 1952 arose to 909,770 barrels, an increase of around 20 percent, and 830,000 barrels were exported to Uruguay. Twenty-three wells were completed, of which 12 yielded oil and five gas. Six were dry holes. Drilling totaled 213,424

feet with five rigs working. While production in the first developed Manantiales field declined, the yield of Cerro Sombrero and Victoria Sud pools increased.

In 1953, Chile's output reached 3,000 b/d, against scarcely 2,500 b/d in 1952, another 20 percent increase. Production for the first five months of 1953 amounted to around 445,000 barrels.

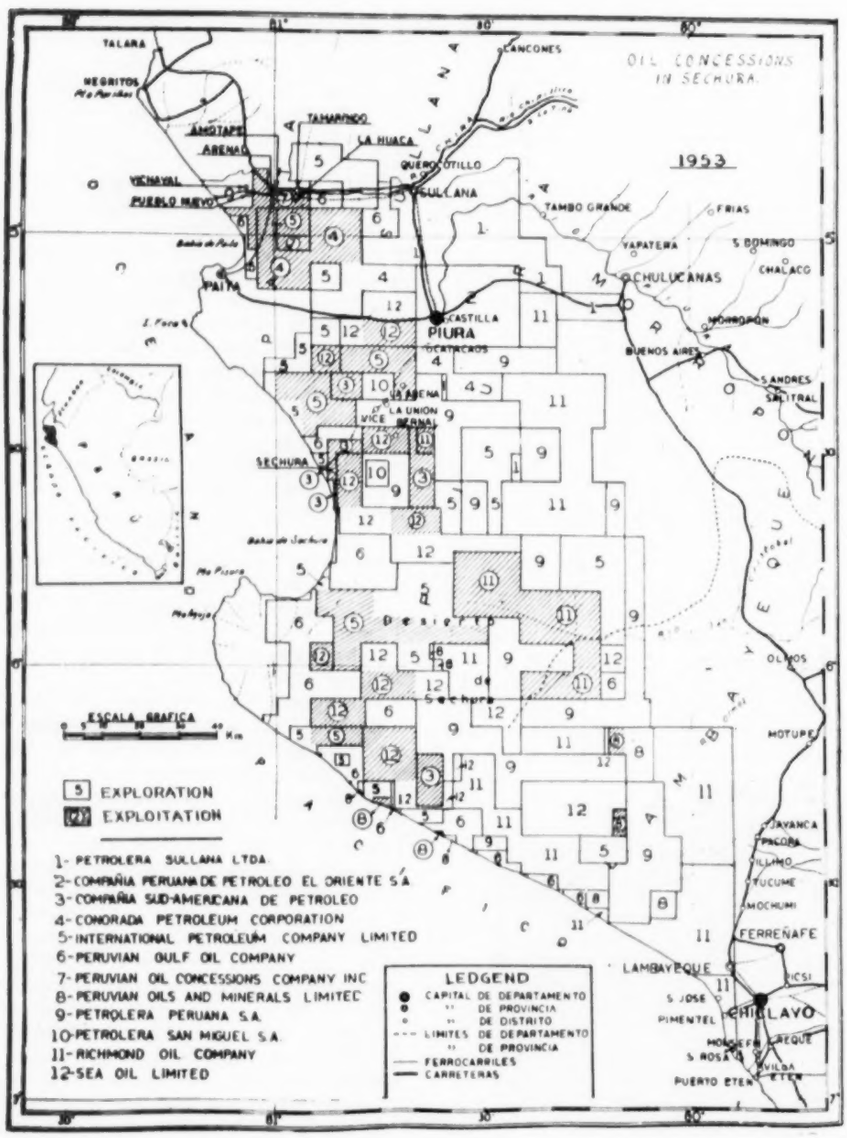
Construction of the refinery at Concon, north of Valparaiso, with a capacity of 20,000 b/d of crude, is expected to be completed during 1954.

In Bolivia, production has remained stagnant. Output in 1952 amounted to 525,721 barrels from 45 producing wells, or 1,436 b/d. Total footage drilled was 29,529 feet. In 1953, production has recreased slightly, yielding for the first four months including April a total of 161,072 barrels, or around 30 b/d per well.

In Paraguay, on request of the Paraguayan Government, a Peruvian geologist of Empresa Petrolera Fiscal has been carrying out geological studies in a search for oil.

In the countries where private companies are operating, oil development was active. Venezuela maintained its first place after the United States. Daily average for the first five months of 1953 was 1,742,756 barrels against 1,803,910 b/d in 1952 from 78 producing fields.

Much drilling of an exploratory nature is under way. Mene Grande, principal operator in Eastern Venezuela, has been carrying on an accelerated wildcat program with over 30 wells scheduled for this year as against 15 in 1952. To the middle of the year, 12 new pool tests have been completed, mostly in the Oficina area, for a total of nine single and double-zone oil wells and one gasser, with only two dry holes. In August, Meneg was nearing final depth of 11,000 feet on an important rank wildcat, Casca-1, in new territory southwest of the town of Aragua de Barcelona.



Socony has been actively wildcatting in the Oficina area of Anzoategui where several dual-zone completions have been made. The Texas Company, in conjunction with SAP Mercedes, has drilled a number of new pool tests in Western Guarico, operating as many as eight rigs at one time. In Falcon, the company discovered a new field with the well Tiguaje No. 1, but has not followed up with further development as yet. Creole is drilling a series of new pool tests in the Falcon area of western Venezuela and at Quiriquire in the east. Sinclair has what appears to be an important development in Barinas with Sinco 1, which is reported to have gauged about 600 and 300 b/d of 27.5° gravity oil from two sands at about 9,000 feet. Sinco 2 is currently drilling in the same area. The wells are some 225 miles from deep water, with no pipe line between. Nevertheless, this is spoken of as the third great basin of Venezuela and there is no doubt of its eventual development.

The deepest well ever drilled outside the U.S.A. is Shell's Pueblo Viejo deep test LS-1387, 17,537 feet deep. This well was spudded in March 1951, and has been undergoing cutting back and testing. Results have not been announced. Shell has drilled several wildcats in and around Lake Maracaibo and a new pool test in the Rio de Oro field on the Colombian border. In addition, the company is reported to be planning others in Anzoategui, Eastern Venezuela, where it has not been active since 1950.

In Colombia, second South American producer, output increased in 1952 about 500,000 barrels to 38,604,000 barrels, averaging 105,776 b/d. In 1953, production increased in March and April to 113,000 b/d, but declined in May to 105,000 b/d. Biggest producer in Colombia in 1952 was Shell with 37,031 b/d from its Yondo-Casabe field, 1,398 b/d from Difficil field, and 740 b/d from Cantagallo. The government's Empresa Colombiana de Petroleos obtained 34,953 b/d from the de Mares concession and Socony-Texas 27,896 b/d from the Barco concession. Output of the Teran field of the Texas Co. was 3,748 b/d. Twenty-three out of 25 rigs were working at the end of June, including three employed by International Petroleum Co.

In its exploration of Totumal field, fifty wells were completed in the first quarter of 1953, and 1,279 producing wells gave an average of 86 b/d per well.

In Ecuador, after abandonment of drilling in the Oriente east of the Andes, oil development is confined to the Tertiary belt on the coast. But, although sedimentary thickness of the Tertiary deposits on the middle and northern Ecuadorian coast is considerable, no new discoveries have been made so far.

Anglo-Ecuadorian Oilfields and Manabi Exploration Co. with two minor producers increased Ecuador's production to around 2,800,000 barrels in 1952. Manabi Exploration Co., which produced 493,199

barrels in 1952 and 175,960 barrels in the first five months of 1953, is also active in central Ecuador in the Manabi region, where it has continued exploration.

After enactment of the new law on March 12, 1952, increased activity has stirred Peru. Three new national companies were constituted for the coastal region of Sechura, and the capital of the Oriente Company working in eastern Peru was increased substantially. Total capital of the private national companies amounts at present to 87 million soles, or almost six million dollars. Thirteen companies, including nine foreign, applied on the opening date of October 28 for concessions and the auction of the overlapping areas yielded more than 38 million soles, or around $2.5 million, for the government. Up to $30 overprice was paid per hectare for the auctioned concessions. Other foreign companies entered later on. The Union Oil Co. took 40 percent of the shares of the national Sullana company and made an operating agreement for the development of its concessions. Union Oil Co. is reported, too, to have negotiated an agreement with Conorada Co., which holds considerable acreage in Sechura. Texas Oil Producing Co. of Houston acquired the holdings of Cia. Petrolera Ganso Azul against a cash payment of a million dollars and three million to be paid from future oil exports. Kendall Refining Co. of Bradford, Pa. and Bay Refining Co. of Saginaw, Michigan hold each a 10 percent interest in the new enterprise.

Texas Petroleum Co., subsidiary of The Texas Co., applied for the maximum of concessions of almost 2.5 million acres in eastern Peru on the Maranon river, effluent of the Amazon. Socony-Vacuum Co., which established two branches, the Socony-Vacuum Oil Development Co. of Peru with a capital of $500,000, and the Socony-Vacuum Oil Co. of Peru with a capital of a million soles ($650,000), is expected to apply for concessions too. Richfield Oil Corporation also is observing the development.

The Sechura desert, on the coast, is almost completely covered by the new concessions. The areas granted are distributed as follows between the different companies (see map):

I. CONCESSIONS IN SECHURA

	Exploration (hectares)	*Exploitation (hectares)*
International Petroleum Co.	178,444	91,032
Richmond Oil Co. (Peru)	312,998	83,494
Peruvian Gulf Oil Co.	129,288	.....
Sea Oil Ltd.	118,224	88,893
Conorada Petroleum Co.	41,109	39,925
Peruvian Oil Concessions Co.	.....	21,849
Peruvian Oils & Minerals Ltd.	25,134	7,185
Compania Sudamericana de Petroleo	.....	27,055
Petrolera Peruana (national)	311,417	.....
Petroleo Sullana (national)	142,065	.....
Petrolera San Miguel (national)	10,417	.....
Cia. Petr. El Oriente (national)	58,800	.....

II. CONCESSIONS IN EASTERN PERU (AMAZON BASIN)

	Exploration (hectares)	*Exploitation (hectares)*
Texas Petroleum Co.	999,988	.....
Ganso Azul Co.	102,816	30,000[1]
Peruvian Oils & Minerals	333,980	42,250
Cia. Petr. El Oriente	735,015	.....
Socony-Vacuum Co.	852,755	.....

[1] Under the old law. Oriente Co. also holds concession under the old law.

III. CONCESSIONS IN SOUTHERN PERU IN THE PISCO AND NAZCA REGION

	Exploration (hectares)
Sea Oil Ltd.	192,500
Peruvian Oils & Minerals	40,000
Consorcio Minero	10,000

By decree of April 24 of this year the submarine shelf was opened for concessions, and on May 15 the corresponding regulations were issued. Beginning from July 9, a term of 60 days was established for applications of national companies and after expiration of an additional term of 30 days for foreign companies. Concessions on the shelf will be granted by bidding and will be awarded to the highest bidder. One new national company already formed for this purpose will be associated with the Douglas Oil Co. of California.

Peru's crude production in 1952 amounted to 16,403,353 barrels, a slight increase over the preceding year. Production of natural gasoline reached 1,035,615 barrels and 144,030 barrels of LPG were recovered, attaining a total production of 17,582,998 barrels. Biggest increase was that of Cia. Petrolera Lobitos, where the development of the boundary zone, operated jointly with IPC, continued to be successful and yielded 1,138,748 barrels. Total production of Lobitos fields was 4,522,471 barrels, augmenting its share in Peru's production to 27.5 percent. International Petroleum Co.'s output from Brea-Parinas field's output was slightly below the preceding year, with 11,306,588 barrels. Empresa Petrolera Fiscal's production was nearly doubled to 374,249 barrels. Ganso Azul's field in eastern Peru yielded 200,045 barrels.

In the first quarter of 1953, production of crude amounted to 3,910,219 barrels and recovery of natural gasoline to 345,392 barrels, divided as follows:

	CRUDE	NATURAL GASOLINE
	(barrels)	
International Petroleum	2,610,745	302,455
Lobitos (incl. joint operation areas)	1,127,220	42,937
Empresa Petr. Fiscal	119,090	
Ganso Azul	53,154	

IPC's Brea-Parinas field showed a decline. Results of a second joint operation by Lobitos in a new zone between Lobitos and El Alto fields have been small so far. Empresa Petrolera Fiscal's operation of the small Organos field shows a further increase. Besides the cable tool rigs of EPF, the two American contractors, Santa Fe Drilling Co., with a rig for development drilling, and Dunlap & Graham, with a rig for exploration, are speeding up drilling. Production in May was 50,672 barrels and in June was around 2,000 b/d.

In the Ganso Azul field, operated now by new owners, drilling, which has been suspended since 1947, will be resumed shortly. One new rig has arrived in Iquitos to be transported to the field and eight wells are projected to increase the output. A contract has been signed to supply crude to the new 5,000 b/d refinery at Manaos in Brazil, to be constructed by the Brazilian Sabbé group. The government refinery at Iquitos, to be relocated from the coast, also will draw on Ganso Azul's crude.

In Sechura, exploration activities have been active. Robert Ray Co. of Houston has two crews engaged in gravimetric and seismic research for Richmond Oil Co. Since July they have also been conducting a seismic survey of the Sea Oil concessions and those of Peruvian Oils & Minerals. A crew of United Geophysical Co. of Pasadena has started surveying the operation area of Union Oil Co., the concessions of Sullana Co.

An airborne magnetometer survey of Sechura has been made for Gulf Oil Corporation, while Carter Oil Co. has carried on geophysical research for International Petroleum Co.

The first exploration well in the middle of the Sechura area will be spudded shortly by the Santa Fe Drilling Co. for International Petroleum Co. A National rig 130 will be employed for the well with a capacity of 15,000 feet.

In eastern Peru, Texas Petroleum Co. is reported preparing to transfer two rigs from Venezuela to its concessions on the Maranon river, and Peruvian Oils & Minerals proposes to drill a wildcat on a structure west of Ganso Azul, surveyed actually from the air.

In southern Peru, applications have been filed by Canadian Sea Oil Ltd. for around 500,000 acres near the port of Pisco, about 250 kilometers south of Lima, and near Nazca, some 250 kilometers farther south near the iron ore deposits of Marcona. Recently Peruvian Oils & Minerals has applied also for around 100,000 acres in the Pisco region. A Peruvian mining company, Consorcio Minero, holds 25,000 acres at Nazca. Sea Oil has started a new geological survey of these concessions.

Oil prospects of the region are not considered highly promising. The Tertiary patches in the Nazca region cover the metamorphised and igneous rocks irregularly, older rocks outcropping nearby.

In the Pisco region, where Eocene beds are exposed on the coast, the Tertiary series is more fully developed and Miocene diatomites, appropriate as reservoir rocks, reach considerable thickness. But the absence of impermeable cover precludes the presence of oil in this sequence. To the south of Pisco, porphories, igneous and Paleozoic rocks outcrop in the faulted blocks with a thin Tertiary cover.

Typical dwelling in a village in the steppe of Northern Afghanistan. Photos courtesy Musee de l'Homme, Paris.

Afghanistan seeking oil development

Native bridge near Kabul in the mountains of Northern Afghanistan.

By Henry M. Captain

NEWS THAT the government of Afghanistan has decided to begin prospecting its petroleum resources has attracted attention to this distant country, which at present is the only region of the Middle East without any source of oil of its own.

This is not the first time that this problem has been approached. Prior to World War II, the Afghanistanis engaged foreign geologists, including H. G. Schenk and H. de Cizancourt, to make a preliminary study of their mineral resources, with special reference to oil. Some French interests that were solicited were hesitant to become engaged in such a distant country whose strategic situation on the borders of Iran, Pakistan and the Soviet areas in Asia was not reassuring.

American interests took hold of the matter, carried out some studies and formed the Amerasia Exploration Company. This company's negotiations with the Afghan government were about to culminate in a concession in 1938, but discovery of the rich Arabian fields raised doubts as to the profitability of the enter-

prise and the project was finally abandoned.

After a period of inaction due to war, the Afghan Minister of Mines turned his attention to some preliminary studies made by an Afghan geologist, Dr. Ahmed Sultan, who had been educated in Europe and the United States. The data which Dr. Sultan had collected were on the whole encouraging, at least as regards the northern part of the country, including the great Bactrian plain which was one of the most flourishing provinces of the vast empire of Alexander the Great in the third century B.C. This province, the steppes of which lie between the huge massif of Hindu Kush and the Amu Darya river, constitutes an extension of Soviet Uzbekistan, where there are several oil fields. It seems probable that the structural conditions that exist in some of these fields in the regions of Uch Kyzyl and Kandag, for example, might be encountered south of the Amu Darya in the region east of Mazar-i-Sharif. Certain productive horizons recognized in Uzbekistan also appear in structures bordering the Hindu Kush.

In another respect, the numerous visible surface shows southwest of Mazar-i-Sharif in the neighborhood of Shibarghan indicates that the Lower Cretaceous sandstones and limestones of this region, now covered by thick layers of marl, may have considerable interest. It is possible that these surface shows may derive from deeper lying Jurassic horizons.

Although the geology of this remote part of the world is still mostly unknown and no geophysical work has yet been done therein, it seems, from analogy with results that have been obtained in neighboring regions, that well placed relatively shallow wells on the fine anticlinal structures resting on the northern slope of the Hindu Kush should have a reasonable chance of success.

This idea has recently been taken up by the Afghan government as part of a vigorous effort aimed at lifting this quasi-medieval country out of stagnation, the danger of which is becoming aggravated by the industrial progress that is being made in powerful neighboring countries such as Pakistan and Soviet Russia. It is evident that the advance of this relatively large region (300,000 square miles) with about 12 million robust inhabitants forming a part of the white race and capable of easily assimilating modern techniques, will require an intensive development of its power resources and its means of transport. There is practically no coal and what little exists is of inferior quality. Hydro-electric power offers some possibilities which are beginning to be utilized with the aid of the Morrison Knudson Company in the region of Kandahar, and of Siemens et Cie. at Surubi on the Kabal river, but as yet there is no railroad nor any regular airline service. The only means of communication is by road.

There is no doubt that a local production of petroleum, even if limited only to the satisfaction of national needs, would be of great importance since it would solve at once the problems of power and transport with the least trouble and expense. Besides, it would obviate the costly drain on foreign exchange which this country must suffer on account of its remoteness from the great channels of world trade; it would strengthen the country's political autonomy and eliminate the possibility of pressure on its petroleum supply that could be exerted by the USSR and Pakistan.

In this light, petroleum appears not merely as a product for the modernization which the Afghanistan economy sorely needs, but also as the essential product without which modernization could never be attained. The Afghan government, and particularly its Minister of Mines, Mohammed Nada Khan, has a clear vision of this situation and has given high priority to its oil projects.

This decision was reached at the time when the outflow of Iranian oil ceased for reasons that are well known, and was put into effect by opening the country to foreign prospectors under conditions analogous to those that have been justified by the brilliant success that has been obtained in several other Middle East countries. But with the intent to avoid losing, even in appearance, any portion of the independence to which its people are deeply attached and which they have staunchly defended by arms in the course of its long history, Afghanistan has undertaken to prosecute exploration for oil on an exclusive national basis. The organization created for this purpose includes a Superior Council which is more political than technical, and has received, under control of the executive and the Parliament, extensive powers over matters relating to petroleum. There is also a national company which has a monopoly of prospecting, production and refining. This government monopoly is very much like the one which is now under parliamentary and public discussion in Brazil.

On this basis, the Afghanistan government decided to finance oil prospecting on its own account and applied to the Technical Assistance division of the United Nations for help in obtaining technical advice. Louis de Laive, the expert recommended by the United Nations, is a Dutch citizen who has a long and distinguished career in Indonesia and the United States. He arrived in Kabul about the middle of 1951 to study conditions on the spot, and to select a location for the first wildcat well. The site selected, based on previous geological studies, was to be located on one of the structures found in the Bactrian plain.

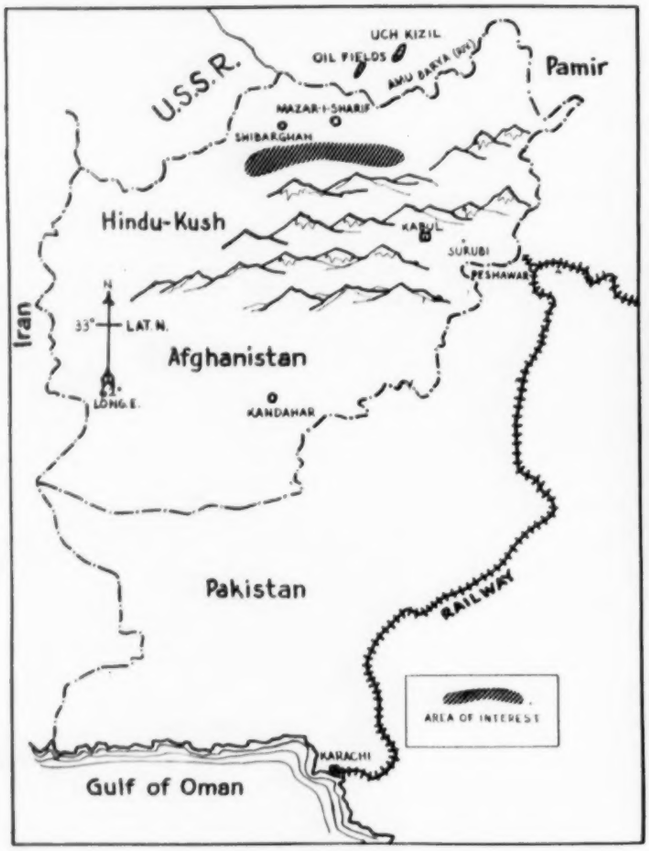
It soon appeared that the choice would not be an easy one. The location considered is situated south of a city called Shibarghan, celebrated for its trade in Persian lamb fur. It is about 750 miles from the nearest railroad station, Peshawar, which is the terminus of the Northwestern Pakistan Railway. It may be added that this railroad, which is about 1,200 miles long, connects Peshawar with the port of Karachi and is one of the most congested railroads in the world; considering the perpetual political tension that subsists between Pakistan and Afghanistan, it does not constitute a favorable factor for priority of transit in favor of Afghanistan. Besides that, the country road from Peshawar to the well site is a rough one. With no asphalt and no macadam, it presents a difficult passage over the Hindu Kush chain at an altitude of more than 9,000 feet. This route is practically closed by snow from January to March.

A caravan rests before the ruins of a Mongol castle on the main road between Mazar-i-Sharif and Kabul.

Its condition is so bad that it requires five to six days for a strong light vehicle, such as a jeep, to cover the 750 miles, at a considerable risk of damage.

For a large part of its course, the road winds through mountainous country and crosses about 15 relatively modern bridges, but it is questionable whether these bridges would support vehicles carrying 10-ton loads.

Order reigns in Afghanistan and the mountainous portions of the route, and also the desert tracts present no danger to foreigners. The population is generally friendly and is able to provide not only a large proportion of needed food, but also the unskilled labor for transport and drilling operations. It is impossible to recruit skilled labor locally, because the country is practically without any industry. The most that can be done is to follow the example of the Morrison Knudson Company,



Typical Afghan mountain terrain.

which is to train natives who will make good drivers of trucks and operators of bulldozers and other industrial machines. On the other hand, diesel oil is scarce and of mediocre quality, which applies also to the gasoline imported from Russia and sold in the northern part of the country. Motor transport is handicapped by the high price of gasoline and the discouraging condition of the roads. The whole country has only about a thousand 5-ton trucks and two or three hundred light automobiles. Facilities for automobile repairs are practically non-existent. Finally, long distance communications are reduced to their simplest form. A single telephone line, which is frequently down, connects the northern part of the country with the capitol, and is reserved for the use of the authorities.

Under such conditions the problem of transporting a drilling rig to Bactria, to keep it supplied with fuel, mud materials, spare parts, casing, and incidental supplies for putting it to work is not going to be easy to solve. In approaching contractors who might be willing to undertake the job, the United Nations expert has let it be known that they are expected to supply, at the expense of the government and for its account, not only a new drilling rig capable of reaching 5,000 feet, along with means for electric and geologic logging, but also equipment for road building, including at least four or five powerful engines; a road fleet of five to six large trucks; all material necessary for the construction and equipment of a camp to accommodate 60 laborers (mostly Afghans); a powerful pumping station for supplying water to the rig and the camp; a radio-telephone station for communication between the well site and the capitol; and a hospital for first aid.

The proposed contract is divided into four sections: engineering matters connected with purchase of the rig and all accessory materials; recruitment and instruction of the personnel for operating it; transportation of equipment and men to various points of operation; and finally the drilling of a wildcat well of medium depth. The Afghan government is to pay all expenses. The contract is to be on a cost-plus basis, the remuneration of the contractor to be determined separately. It is estimated that the total expense will be in the neighborhood of $2 million and that the drilling operation can be finished in about 20 months after the contract is signed.

A number of companies having the necessary experience showed an interest in the proposition on this basis: the competition eventually narrowed them down to three—the Santa Fe Drilling Company of Santa Fe Springs, California; the Drilling and Exploration Company of Houston, Texas; and the Societe des Forages en Afghanistan of Paris (France) which is a subsidiary of the Societe Nationale des Petroles du Languedoc Mediterraneen (SNPLM) a contracting and operating concern which holds concessions in the south of France. The proposition of the French company was considered to be the best thought out and the least burdensome, and for this reason, the contract was awarded to it last summer.

Since then it has been reported in the press that political difficulties have induced the Afghan government to delay the execution of its petroleum projects in order to avoid displeasing a powerful neighbor. It is hoped that these rumors will not be verified, and that in a free world a project on which depends the future of a friendly and undeveloped country can be put into effect under the auspices of the United Nations without encountering a veto that will be difficult to explain except that it contemplates imperialist aims.

Venezuelan industry maintains active growth

VENEZUELA'S production during the first six months of 1953 was down less than five percent from last year's record levels. In all other respects the industry was stronger than ever at midyear, and building for the future at an unprecedented rate. Exploration, both on the surface and with the drill, continued at 1952's high rates or better. Investment in new plants was higher, with major projects in pipe lines, refineries, and injection and pressure-maintenance plants completed, under way or planned.

Major problems confronting the industry were two. The more immediate one was to negotiate with labor a new "collective contract" to supplant the one that expired in August. The other was to prepare for adjustments which may become necessary if the Simpson proposal, or some variant restricting imports, is adopted in the United States.

Production this year will almost certainly pass 600 million barrels, even if currently reduced rates are further depressed. In the first six months, production totaled 315,829,951 barrels, an average of 1,744,532 b/d. This represents a drop of 4.5 percent as compared with the daily average for the first six months of 1952, but is only 3.3 percent under the average for the entire year 1952. Table I gives highlights from Venezuela's history as a producer, with details of the recent past.

The current cuts have been made in the heavier grades of crude, mainly from the Tia Juana, Lagunillas and Bachaquero areas of the Bolivar coastal fields of the Lake Maracaibo basin. Nearly 200,000 b/d of 12-15° gravity potential was closed in at midyear. Creole Petroleum Corp. and the Compania Shell de Venezuela Ltd. (new name as of July 1), as the principal producers, were most affected.

During the half year wells were being completed at about the 1952 rate of 110 per month, 1,320 for the year. More rigs were running, an average of 113 as against 110 last year, so that under ordinary conditions it would have been reasonable to expect more completions. However, operators were taking advantage of the temporary slackening of demand to switch rigs from development to wildcat drilling. As a result, the number of rigs on new-field and new-pool tests has been averaging 34.5 this year as compared with 27.3 in the first half of 1952, and completion time has been correspondingly slower.

Surface exploration has continued at 1952's high rate, without the usual dropping-off in the wet season. With an average of 41 parties in the field, about half were seismograph crews. Cost of operation was estimated to be running about $1,250,000 per month. Wet-season decline shows up in the table below for 1952, but not for 1953:

EXPLORATION PARTIES

	1952	1953
Jan.	44	42
Feb.	44	41
Mar.	42	42
Apr.	40	42
May	38	41
June	36	41

Creole Petroleum Corp., largest single producer in the world until last year, when Aramco averaged 824,000 b/d against Creole's approximately 800,000, plans to make capital expenditures of $100,650,000 in Venezuela in 1953, for an increase of 4.5 percent over 1952. Refining plant will take a big share of this money.

Refining has been the major objective of oil investment in Venezuela in the postwar period. Creole, Shell, Mene Grande and Phillips have set up plants since the war's end. From 1918, when the first refinery was built by Shell at San Lorenzo on Lake Maracaibo, to 1939, refining capacity grew only to 54,000 b/d. It has increased by 356 percent in the

TABLE I

VENEZUELA'S PAST PRODUCTION (Barrels)

Year	Year's Total	Daily Average
1917	121,000	331
1925	20,046,000	55,000
1931	116,517,000	319,000
1939	204,880,000	561,000
1944	257,037,000	702,000
1945	323,403,000	886,000
1947	434,890,000	1,191,000
1949	482,299,000	1,321,000
1951	622,695,000	1,706,000
Cumulative through 1952	6,834,237,000	

1952 AND 1953 PRODUCTION

Month	Total—1952—b/d		Total—1953—b/d	
Jan.	55,578,173	1,792,844	56,162,079	1,811,680
Feb.	48,135,641	1,719,130	53,074,204	1,978,423
Mar.	53,306,372	1,719,560	56,424,775	1,820,154
Apr.	52,366,318	1,745,543	54,924,357	1,830,811
May	53,944,061	1,740,131	57,193,161	1,844,942
June	52,499,387	1,749,979	54,763,352	1,825,451
Total & Average Year	315,829,951	1,744,532	332,491,928	1,826,908
			660,488,578	1,804,613

TABLE II

VENEZUELA DRILLING OPERATIONS
Wells Drilled—Past Years

Year	Devel.	Wildcat	Total	Thousand Feet Drld.
1925	237	14	251	582
1931	196	14	120	269
1939	431	21	452	1,687
1945	506	29	235	3,020
1947	725	62	797	3,948
1949	626	56	682	3,582
1951	1,198	107	1,205	5,424
1952	1,214	108	1,322	6,624

Rigs Operated 1952-1953
(Excluding workover)

Month	Wildcat 1952	Wildcat 1953	Devel. 1952	Devel. 1953	Total 1952	Total 1953
Jan.	24	28	84	88	108	116
Feb.	25	32	85	87	110	119
Mar.	26	32	85	82	111	114
Apr.	31	36	80	75	111	111
May	26	43	83	69	109	112
June	32	36	81	71	113	107
Average	27.3	34.5	83.0	78.6	110.3	113.2

Air view of Creole installations at the Amuay Bay refinery site on the Paraguana Peninsula, Falcon State, in northwestern Venezuela.

Creole's power plant at Punta Gorda on the eastern shore of Lake Maracaibo.

past five years and by 590 percent in the past decade, that is, since a refining obligation was attached to concessions by the 1943 Law of Hydrocarbons. At the end of 1952, daily capacity was 543,000 barrels, an increase of 69 percent over the previous year. During the year, 127,000,000 barrels were refined in Venezuela, 18.24 percent of total production and 10.34 percent higher than the proportion refined in 1951.

The year 1953 will witness a further expansion. The Amuay Bay refinery of Creole, on the Paraguana Peninsula of western Venezuela, is doubling its capacity to 120,000 b/d. In the next two years, $35 million will be spent on expansion, bringing to $141 million the total investment in the refinery. Diesel oil, fuel oil, gasoline and kerosine capacity will be doubled, and a fluid Hydroformer for the reforming of about 10,000 b/d of high-octane products will be installed. The new plant will manufacture 91-octane gasoline, the standard for avgas in Venezuela, and some of the components used in the manufacture of 100 and 115-octane gasoline, these latter to be exported.

An ancillary project already completed was the construction of a second 150-mile 26-inch pipe line to bring Bolivar coastal field crude to the Paraguana Peninsula for refining. This line began pumping in March at 60,000 b/d. Additional pumps will eventually be installed and the two lines will have a total daily capacity of 515,000 barrels. Investment in the original line was $30 million, in the second, $22 million.

Another major Creole project scheduled for 1954 is the construction of one of the largest pressure-maintenance plants in the world, to be built on a platform in Lake Maracaibo seven miles offshore. It will inject 137 million cubic feet of gas per day into one reservoir of the Lagunillas-Tia Juana area at a pressure of 1,950 psi. If it is a success, this $20 million plant will be followed by others to inject other reservoirs.

The reservoir to be treated produced 114 million barrels from 1939 to the end of 1951, and the original reservoir pressure of 2,590 psi dropped to 1,740.

Under normal depletion, production was obtained by a combination of solution gas drive, gravity drainage and secondary gas-cap expansion. Creole engineers estimate that the gas-injection project will achieve a 33 percent increase in ultimate recovery and a 50 percent increase in maximum efficient rate.

Contract for the design and construction has been awarded to Brown & Root, Inc. Ten centrifugal compressors capable of developing over 2,000 psi are being designed by Ingersoll Rand, each to be driven by a 5,000 hp General Electric gas turbine. The 50,000 total horsepower will be the largest industrial concentration of gas-turbine horsepower thus far built.

Gas for the project will be gathered from eight Creole flow stations, and the gathering system, some of the lines of which are 30 inches in diameter, will be a major engineering project in itself since the lines must be laid in the bottom of Lake Maracaibo.

Shell's Cardon refinery, located near Creole's plant on the Paraguana Peninsula, is also being enlarged. A $25 million lubricants plant, the first in Venezuela, went on stream there in 1952, and overall capacity was raised to 140,000 b/d by the end of that year. Units now being installed will bring the figure up to 170,000 before 1954. With the San Lorenzo plant running about 40,000 b/d, Shell then will be refining a total of 210,000 b/d within Venezuela, as compared with Creole's 200,000 b/d from Amuay Bay and Caripito, eastern Venezuela.

Both Creole and Shell are conducting pilot water injection projects on a scale which may be greatly increased. Creole has begun the drilling of four water injection wells in the 15 year old Jusepin field of eastern Venezuela. Shell's experiment will inject 3,600 tons per day of treated Lake Maracaibo water through ten wells in the 26 year old Cabimas field, at pressures up to 1,000 psi. Initial cost of this project will be $1,250,000.

Several important gas-and-gasoline projects are under way in eastern Venezuela. Creole, Mene Grande, Socony and Pantepec will jointly build a combination natural gasoline and crude stabilization plant in the San Joaquin area, to process 65 million cubic feet per day of gas and 25,000 b/d of oil. A gasoline plant is being added to Mene Grande's west Guara pressure maintenance plant. This new unit will process about 40 mmcf/day of gas, recovering 1,600 b/d of natural gasoline. Mene Grande, Creole and Socony are planning the erection of a combined gas injection and gaslift compressor plant for the Chimire field. Between 35-40 mmcf/day will be processed, most of it returning to the formations for pressure maintenance, with the rest used to lift oil from dead or weak wells in the field. Another Chimire project is a natural gasoline plant to process all the gas handled by the compressors, recovering about 1,000 b/d of natural gasoline.

Mene Grande has made important additions to its pipe line network in eastern Venezuela. Principal new elements consist of 16-inch line between Oficina and Anaco (40 miles), and of 26 and 16-inch lines between Anaco and Puerto la Cruz, a distance of 60 miles. With these improvements, Mene Grande is able to pump part of its 250,000 b/d production from Greater Oficina directly to the tanker terminal at Puerto la Cruz, 100 miles away, bypassing the Anaco tank farm where Oficina area crudes were formerly stored en route to the port.

The most pressing problem facing the industry at the middle of the year was that of agreeing with labor on a "collective contract" to replace the agreement which has governed labor-industry relations for the past 18 months and is now expiring. That set of regulations was decreed by the government when it proved impossible for labor and the industry to come to terms.

The Minister of Labor has announced that he earnestly hopes that the govern-

ment will not have to intervene this time, but the likelihood of this does not appear encouraging. Labor is coming to the bargaining table armed with documents containing scores of clauses based on the declared proposition that the companies are making huge profits, especially in view of their current "lower costs of production." Just why production costs should be assumed to sink in Venezuela at a time when they are rising everywhere else is not clear.

The original collective contract in 1948 raised the cost per worker to the industry to about $15 per day, about $5 of which represented benefits such as housing, medical care, retirement and savings plans, subsidized commissaries, clubs and schools. The second contract, decreed in 1952, raised labor costs by about 13 percent.

Present proposals aim at a similar result. Among the hundred-plus clauses of the two plans submitted by labor are: double pay for daylight overtime, triple for night services, and quadruple when a work holiday coincides with a day of rest; the elimination of contractors, on the ground that they tend to evade legal obligations to their workers; 90 percent Venezuelan personnel instead of the 75 percent currently obligatory; equal pay for Venezuelans and foreigners with the same job classification; 30-day vacation with double pay for each year of service, and vacation transportation paid; payment for fractional vacation and severance-pay periods; extra sliding-scale pay for workers on water, at specified altitudes, at specified temperatures; "family salary" formulas, based on the number of children and other dependents; greater union control of company commissaries; wider medical and educational benefits; 0.3-cent per barrel produced to be paid by the companies into the welfare funds of unions; and so on through a sweeping list of demands.

Creole Petroleum, whose contract was first to expire, began talks with labor representatives on August 1. Other companies were to start negotiating at times beginning a month later. The discussions can be expected to continue for several months, during which time "work stability," meaning no firings, has been guaranteed.

To meet the expected renewal of the attempt to shut off United States imports of oil, which come mainly from Venezuela, a permanent committee has been set up by business and government to study the problem and fend off future attacks.

Special representatives, including the Venezuelan Ambassador, have put the case to Washington officials. Technical experts have worked up charts and graphs to demonstrate that Venezuelan oil complements but does not supplant U.S. domestic supply. Others have pointed out that the U.S.A. had a favorable balance of trade with Venezuela in 1952 of $370 million; asked whether the Middle Eastern countries would buy $500 million worth of goods annually from the United States; and whether, in an international emergency, oil from Kuwait and Saudi Arabia could be counted on to reach the United States.

Worker listens for passing of "pig" in pipe ready for launching at Gulf of Coro crossing.

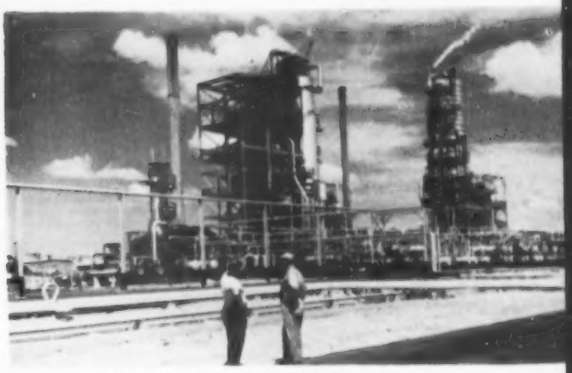
Exclusion from the United States market would be a severe blow to Venezuela, though its share in this trade is being reduced regardless of legislative action. The percentage of United States oil imports coming from Venezuela has fallen off by 14 percent between 1948 and 1952, the loss being replaced by Middle East crudes. Meanwhile, other markets are being found. At present, only 37.9 percent of Venezuela's production goes to the United States, 3.6 percent is consumed in the domestic market and the remaining 58.5 percent is consumed in 68 countries in all parts of the world.

In recent months, Argentina has declared itself ready to take more Venezuelan oil. Presumably this would be brought about by a deal between the two governments, Venezuela taking its royalty (minimum of 1/6) in kind instead of cash, as it did in the earlier postwar years, and shipping it for its own account to Argentina. There has been some agitation for a national tanker fleet.

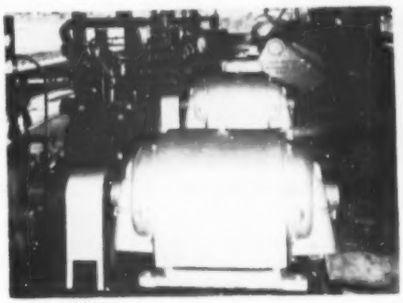
An economic mission headed by the Minister of Development recently returned from a visit to Brazil during which an exchange of Venezuelan oil for Brazilian products was discussed. Brazilian interests are expanding the Cubatao refinery from 45,000 b/d to an eventual 70,000 b/d capacity, with some such arrangement in mind.

The French market may be widened also. The French tariff on Venezuelan oil, as well as on some other commodities, was recently lowered by 25 percent. A French-Italian banking house has had representatives in Venezuela to discuss possibilities in this direction. This firm owns the C. A. de Intereses Petroleros de Venezuela, which has been operating a seismic project over open acreage in Barinas.

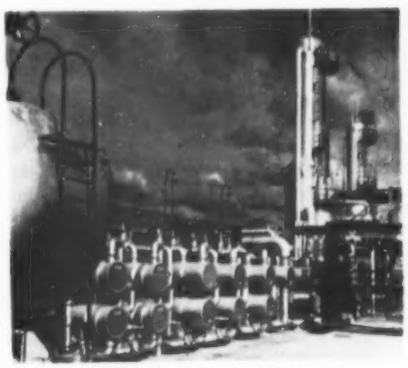
Mountain stretch of Jusepin-Puerto La Cruz pipe line.



Amuay refinery, Paraguana Peninsula, western Venezuela.

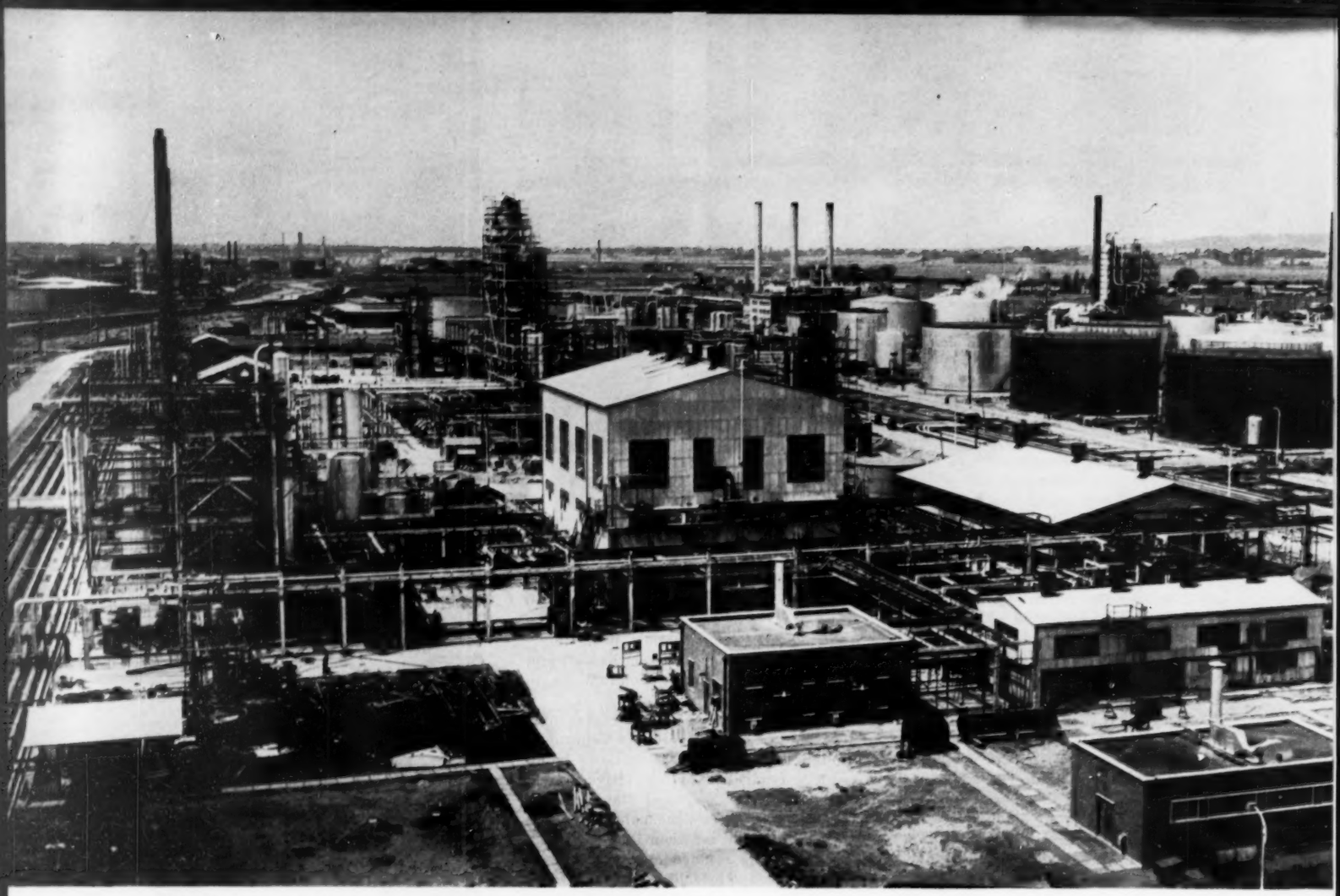


Interior view of main pump station at Quiriquire.



Above, stabilization plant at Jusepin.

Below, Creole docks at Amuay Bay.



General view of the MEK unit from the Thermofor catalytic cracking unit.

VACUUM'S CORYTON REFINERY NEARS COMPLETION

WHEN PREPARATION for the erection of Vacuum Oil Company's refinery at Coryton began September 16, 1950, the site, roughly a mile long by a half-mile wide and almost completely surrounded by water, consisted mostly of rough grazings on alluvial deposits, interspersed with creeks or fleets and below high water level. It had been occupied by an explosives factory during World War I. Later on an oil storage installation and a small refinery had occupied a portion of the ground. Incidentally, one of the first Cross cracking units to be built outside the United States had been erected there.

After World War II, the few storage tanks here were still in position, as was the oil refining plant, together with a large amount of asphalt in drums. Before any useful preparation work could be done for the new refinery the remains of the old plants had to be disposed of.

At the present time the new refinery is an example of what can be done on a difficult site. An infill of 800,000 cubic yards was necessary to bring the site up to a workable grade. It was also necessary to drive over 12,000 piles to support various structures, tanks and pipe lines.

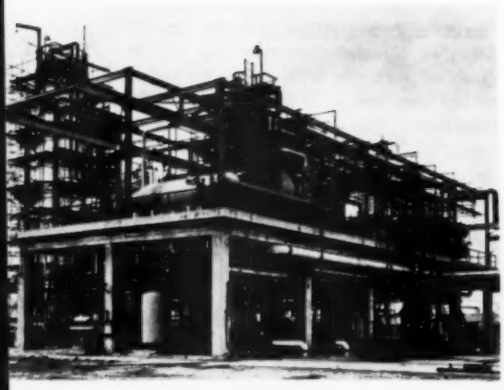
New buildings, used as offices, workshops, canteens, stores and garages, have risen, with wide concrete roads giving clean and easy access to all parts of the plant. The intervening spaces are laid out with well-kept lawns, and as a background, the tall fractionating towers of the various units, with their aluminum paint, the chimneys, supporting structures of the various plants—all bright and clean from good housekeeping—are pleasing to the eye of the oil man, whether he be executive, technician, tradesman or process operator.

Actually the first units of the refinery were already on stream January 31, 1953, when the disastrous floods along the East Coast occurred, with the result that the sea walls of the refinery were breached, the plant being flooded and forced to shut down.

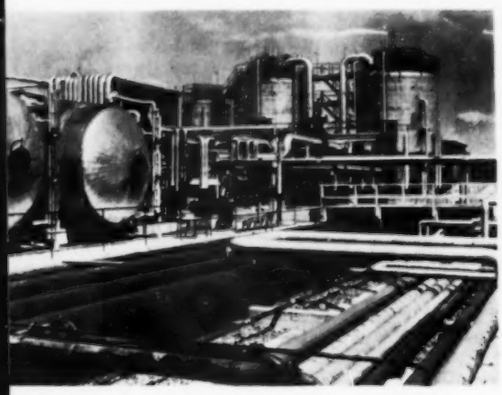
Repair work began immediately and refining operations recommenced before the end of February. Today there is practically no evidence, except that of the repaired sea walls, remaining of the disaster, thanks to the efforts of all concerned to repair the damage.

The refinery has been designed for the main purpose of producing 700,000 barrels of various grades of lubricants *per annum*, with the possibility of having to use four different types of crude oil as feedstock.

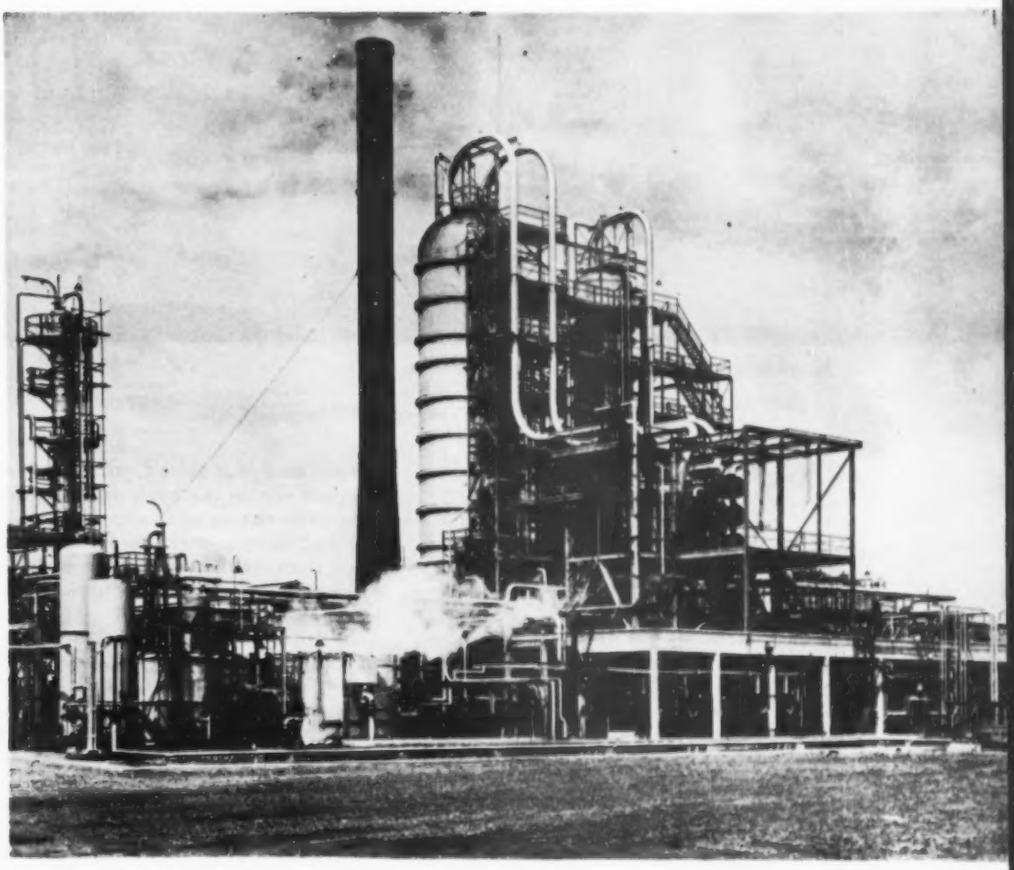
With these conditions in view, it was necessary to study closely the various percentages of distillate produced from these crudes to avoid the possibility of bottle-necks occurring which might disturb the continuity of production; so the various units of the process have been designed to give maximum flexibility. In the design program there is no projected



Propane de-asphalting unit seen from the northeast.



Pipe tracks and water treating plant.



View of distillation unit from the southeast.

production of kerosine as such. These fractions are used for the production of fuel, either by cracking or blending.

The building program was divided into three main phases: (1) the crude distillation side, thermal reforming and gasoline treatment; (2) vacuum distillation of the residue from the atmospheric unit and erection of the propane de-asphalting unit, the solvent treating unit, and the de-waxing unit; and (3) the catalytic cracking and continuous percolation unit.

The first two parts of the program have been completed and are on stream, and the third portion is rapidly nearing completion.

At the present time, Middle East crudes from two sources are being processed; these are not blended for process, but are segregated as far as possible. Complete segregation is not possible owing to tankage conditions. All crudes delivered to the refinery are stabilized. The principal contractor for the building of the plant is The Lummus Co.

The two-stage distillation unit, engineered by Foster-Wheeler, has a design capacity of 21,200 barrels of crude per stream day. The atmospheric unit gives an overhead gasoline fraction and three side streams (naphtha, kerosine and light gas oil), with heavy residue going direct to the vacuum unit. Percentages of these products vary according to the crude oil which is being processed.

From the vacuum side of the unit four fractions and a heavy residue are produced: that is, heavy gas oil, three raw lube oil distillates and vacuum bottoms.

The thermal reforming unit has a designed capacity of 2,500 barrels per stream day and the naphtha from the atmospheric distillation unit provides the feed stock. Products from this unit are gas, reformed gasoline and reformer tar or bottoms. The gas goes to the refinery gas system for use as fuel in the process plants and boiler house, the reformed gasoline for treatment and the reformer tar for fuel blending.

The Thermofor catalytic cracking unit is the first of its type to be built in the United Kingdom. It is of the design developed by Socony-Vacuum Oil Co. and is being engineered by The Lummus Co.; it will be completed by the autumn of this year. Bead catalyst is to be used, the beads being about 3/16 inch in diameter. The beads are very robust and little mechanical loss takes place. The unit will have a design capacity of 10,000 barrels per day with a coke burning capacity of 6,000 pounds per hour.

In the operation of the plant, the feed stock is heated to cracking temperature in a separate furnace, whence it passes into the reactor in the form of vapor or a mixture of vapor and liquid. In this vessel the cracking takes place, coke being deposited on the catalyst and the cracked vapors going to the fractionating tower, where they are separated into gas, gasoline, distillate fuel and synthetic crude tower bottom (STB). The latter pass through a fines settler where any small amount of catalyst fines which may be carried over is separated out. The gas passes to the refinery gas system for use of fuel, gasoline goes for treatment and the distillate fuel and STB go for blending.

The exhausted catalyst drops by gravity into the regenerator where it is revivified by burning the carbon off in a current of air. The heat generated in the reaction is extracted by cooling coils which serve as steam producers, giving steam at 600 pounds pressure which is fed into the refinery steam main.

Intermediate tankage for block operation storage.

The regenerated catalyst flows into the lift pot from which it is blown by air to a height of more than 200 feet into a separator, to take out a very small quantity of fines; from there it passes again to the reactor. The rate of catalyst circulation will be about 300 tons per hour.

The feed stock for the unit will consist mainly of light gas oil from the atmospheric distillation unit, heavy gas oil from the vacuum unit and extracts from the furfural solvent treating and MEK units, the latter two forming about 25 percent of the feed.

Gasolines from the three sources, the atmospheric unit, thermal cracking unit and TCC unit, are treated separately and the treated spirits blended to market qualities following which the tetraethyl lead and dye are added.

Treatment for all three is on the same principle, with variations according to requirements, first a caustic soda wash, then a solutizer treatment, no tannin being used, and finally an anti-oxidant inhibitor added before leaving the unit.

In the lubricant section the three side stream distillates and the vacuum residue are treated for the manufacture of lubricant blending stocks. By varying operating conditions in this section seven basic lube oil stocks are produced as follows:

(1) Spindle oil.

(2) High Viscosity Index light neutral oil.

(3) High Viscosity Index light neutral turbine oil.

(4) High Viscosity Index neutral oil.

(5) High Viscosity Index heavy neutral turbine oil.

(6) High Viscosity Index bright stock.

(7) Cylinder oil.

The charge to the propane de-asphalting unit is the vacuum tar from the vacuum unit, which is treated by liquid propane under pressure to precipitate the asphalt tar and leave a clarified stock. In connection with this unit is the de-propanizing unit for removal of propane from the extract and tar and its recovery for further use.

This is the only section in the lube oil plant which is run continuously, as it has only one class of stock to treat. The other parts are run on the block system, there being four classes of stock: spindle oil, light and heavy, neutral and de-asphalted bright stock. Sufficient tankage is available for storage to suit the block operations.

The solvent treatment is by the standard furfural process with the necessary furfural separation from the raffinate and extract and its subsequent recovery and drying for further use. The process is continuous on single stocks, the stocks being stored up for block operation. According to V.I. requirements, the proportions of furfural to feed stock are varied. The raffinates are further treated in the MEK plant, while the extracts go to make up the feed for the cat cracker.

Sufficient tankage is available for storage of the raffinate to continue the block operation in the MEK plant.

The plant is designed for the production of stock for the manufacture of 700,000 barrels of finished lubes per year.

As its name implies, the MEK dewaxing section separates wax from the solvent-treated raffinates in order to lower the pour and set points, and is the modern recognized process of effecting this. The raffinate is mixed with methyl-ethyl-ketone, and the whole mixture chilled, when the waxes crystallize out. The chilled mixture is then passed through filters in which the crystallized portion is separated from the still liquid portion. MEK is then distilled from the two separated fractions and used as further treating stock. The dewaxed liquid lubes pass on to the Thermofor continuous percolation unit for decolorization and final clarification. The by-products from the process —the slack wax and petrolatum—are subjected to further MEK treatment to remove any entrained oil and petrolatum, giving a micro-crystalline wax and petrolatum slops, the latter being used as part of the feed for the cat cracker. The micro-crystalline wax is decolorized and clarified in the clay percolation plant and is then slabbed ready for marketing.

The Thermofor continuous percolation unit, which is the first commercial sized plant to operate this continuous process, is built in two sections, one for the filtration of oil and the other for the filtration of wax. It is designed to use as filtering medium a 30-60 mesh grade of conventional clay or alternately similar grading of bauxite or fuller's earth.

It consists of a percolation section, a naphtha wash section and a clay regeneration section, all working continuously, both the oil percolation and the wax percolation sections working on the same principle.

The feed stock is pre-heated to a desired temperature and is fed into the bottom of the percolation tower through a multi-nozzle distributor.

The clay feed, which is adjusted in quantity to give the required product color, is fed in at the top and distributed over the cross section of the tower by a number of feed pipes. The filtered product passes out at the top of the tower, through a blotter press to take out any traces of entrained fines, and then to storage.

The exhausted clay is drawn off at the bottom of the tower through a control system and passes to the wash tower. This gives true counter-current operation and ensures full utilization of the clay, the untreated oil passing first through relatively inactive clay and finally passing through highly reactive fresh clay in its final path. The exhausted clay goes to a wash tower where it is washed counter-currently with naphtha. The naphtha-laden oil then passes to a stripping tower, the naphtha returning to stock for further use.

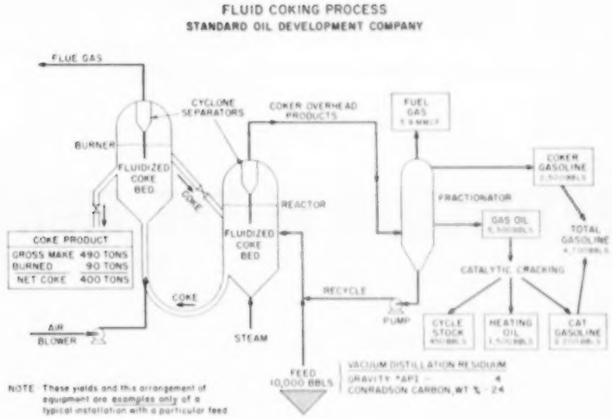
The stripped oil is of such quality that it can be returned to feed stock for further processing, thus reducing losses.

The washed clay is dried from naphtha and continuously passes, naphtha free, to a Thermofor clay burning kiln for revivification and then to storage for further use. The micro-crystalline wax from the second MEK treatment is de-colorized in a similar TCP unit and goes to a slabbing machine.

This process gives less oil loss and less clay consumption than the usual intermittent clay treatment process with the same quality of final products.

Lubricating oil units seen from turbo-generator building.

CONTINUOUS FLUID COKER



Product of the fluid coking process is in the form of granules.

CULMINATING a four-year research program, Standard Oil Development Co. has announced the development of a continuous coking process. The process employs the fluidized technique used in catalytic cracking.

Two Standard of New Jersey affiliates will install units. Carter Oil Co. will build a 3,000-barrel unit at Billings, Mont., and Esso Standard Oil Co. will build a 10,000 b/d unit at Baltimore and a 20,000 b/d unit at Baton Rouge, La.

Engineering is complete on the Billings unit and bids are to be taken from contractors shortly. It is planned to have this first commercial unit on stream late in 1954. The two Esso units are planned for late 1955 or early 1956 completion.

Standard will offer the process on a royalty basis to other refiners. Principal refinery construction companies will be licensed to build units.

The process has been brought to the commercial stage in a 100 b/d pilot plant at Baton Rouge. This is the same plant in which fluid catalytic cracking was developed more than 10 years ago. The pilot installation itself represents an investment of about $750,000. It is a 13-story structure, 115 feet in height, and requires a 5-man crew per shift to operate.

The physical equipment is similar in many respects to that employed in catalytic cracking, although less elaborate. It consists essentially of three principal vessels, a coker, a burner to supply process heat and a fractionating column to separate liquefiable parts of vapors recovered from the heavy oil charge. An accompanying diagram illustrates flow through the unit and shows typical yields.

Referring to this chart it will be observed that in this case 10,000 b/d of 4-gravity vacuum still bottoms is fed to the reactor in which a level is maintained of granulated coke agitated by steam. Temperature in the reactor is maintained at 950 to 1,050°F. Pressures are essentially atmospheric.

In the reactor, part of the charge is cracked, part is vaporized and the carbon forms into small particles about the size of coarse sand. Overhead from the reactor is transferred through a cyclone separator to the fractionator. From the bottom of the reactor a portion of the coke flows to a transfer line where it is boosted by a stream of compressed air into the second fluidized coke bed in the burner. Hot coke from the burner returns to the reactor carrying enough heat to support the process. Coke product is removed to storage from the lower part of the burner.

Gross coke product in the example given is 490 tons per day, of which 90 tons is consumed in the burner to supply reactor heat. Gas could be used to supply heat to the reactor and the entire coke product be recovered for sale.

Vaporized portions of the charge give a yield from the fractionator of 2,500 barrels of cracked gasoline and 5,300 barrels of gas oil, plus 3.9 million cubic feet of gas. The gas itself contains fractions valuable for petrochemical processing. The gas oil may be catalytically cracked to produce an additional 2,200 barrels of gasoline, 1,500 barrels of furnace oil and 450 barrels of cycle stock.

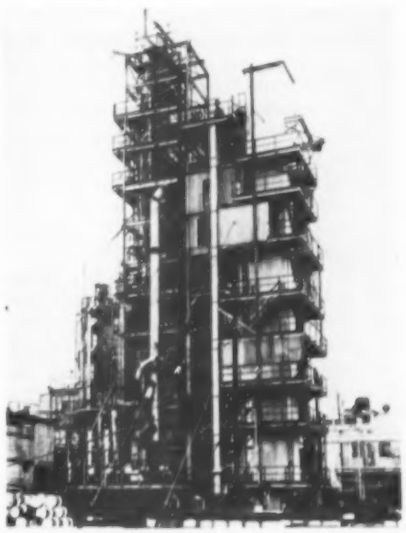
In starting up a unit, coke is pulverized and the system filled before residuum is charged.

During operation, there is a tendency for the carbon particles to increase in size. This can be controlled in a number of ways. One such is to remove largest particles from the burner by elutriation.

Investment cost of a fluid coker will be something in excess of half the cost of a fluid cat cracker of similar capacity. It is calculated by Standard Oil Development engineers that plants as small as 1,000 b/d will be economic under present market conditions where fuel oils bring about $1 per barrel less than crude. The process increases the yields of valuable light products, and at the same time releases substantial quantities of middle distillates which otherwise would be required to blend up vacuum still residuums to produce merchantable fuel.

Residuals with initial boiling points as low as 600°F. and vacuum still products with initial boiling points of 1,100°F. or higher can be handled. Stocks of 1.8 gravity with 35 percent Conradson carbon have been processed in the pilot plant.

In a rough calculation, Standard men estimate that complete conversion of the industry to vacuum stilling and fluid coking would reduce crude requirements for light and middle distillates by about 13 percent. From this standpoint, they look on the process as a distinct contribution to oil conservation.



Originally the proving ground for fluid catalytic cracking, this 100 b/d pilot plant at Esso's Baton Rouge laboratories was modified for development of the new coking process.

PETROLEUM IN THE EIGHTY-THIRD CONGRESS

By Joseph Huttlinger

FIRST SESSION of the Eighty-Third Congress, prior to its adjournment early in August, recorded some momentous actions affecting petroleum and natural gas. Probably the most noteworthy was the enactment of the tidelands bill which became law with President Eisenhower's signature after 15 years of stalemate marked by two vetoes of previous Congressional efforts by President Truman.

The passage of legislation to sell the government's 28 synthetic rubber plants, which cost $700 million, also marked the end of years of delay. Petroleum companies expected to be among the bidders for these properties include previous operators of some of the plants.

The hottest battle in years to cut down petroleum imports occurred during the session. The fight was led by the Coal Association with support by various groups of domestic oil producers. It was ended temporarily on July 23 when the House refused to enact legislation setting a quota ceiling on imports.

The session saw the end of price controls, a truce in the Korean war, a shift from economic planners to businessmen in high government jobs and a new advance to the highest levels of prosperity in the history of America.

Congress considered two natural gas bills, one to remove some federal controls over the distribution of natural gas, the other to provide that lines crossing the public lands need not be common carriers. El Paso Natural Gas Co., fresh from victories in two court actions, appealed for the common carrier legislation. The gas distribution bill failed to get Senate approval on the final day of the session.

In all, Congress devoted rather more time to oil and gas matters than to any other single subject. About half the Senate debate was on oil and gas, a record established by the marathon filibuster on tidelands which led finally to handling the matter in two bills rather than one.

Opinion among believers in individual enterprise rather than governmental control of business and industry appears to be that Congress did a good job in the decisions it reached though there is some criticism that it did not accomplish more. In general, it adhered to principles which the party in power had supported, but there were compromises. The tidelands bill did not give enough title and revenues to the states to suit partisans in the coastal areas. The legislation finally enacted provides that the states shall have title and revenues from oil and gas production out to their historic boundaries; beyond these the federal government is to control to the end of the continental shelf. The boundary is three miles for most states, 10.5 miles for Texas and Florida.

Congress made drastic cuts in many appropriation bills but could not prevent the deficit resulting from previous commitments. Taxes, instead of being reduced, were maintained by extension of the excess profits levy. The Korean war continued longer than many had expected, and President Eisenhower asked authority, which was not granted, to raise the national debt by fifteen billion dollars. The reciprocal trade agreements program, designed to promote trade by mutual concessions, was continued with little change. Foreign aid spending was continued on a reduced basis with $6 billion allocated for the coming fiscal year.

Here is a roundup of major developments:

In choosing his Cabinet shortly after his election last November, President Eisenhower displayed a preference for businessmen. An example was his selection for Secretary of the Interior of Douglas McKay, head of a large automobile agency in the state of Oregon and former Governor of the state. The President displayed this preference in naming scores of men to high places in government, including assistant secretaryships, and to dozens of commissions such as the Federal Power, Trade, Communications and Tariff commissions, which deal with matters vital to the petroleum industry.

Secretary McKay, a man of great personal charm, won the approval of the oil and gas industry from the start. He praised the industry, and continued its National Petroleum Council, 100-man advisory group of top industry executives, as well as its counterpart, the Gas Industry Advisory Council. He pared to half size ($4 million a year) the government's synthetic liquid fuels industry and spoke out for a middle ground in the oil imports dispute. He said that importing companies should cut back superfluous imports by voluntary action, but he was against a law about it. During his first seven months in office, the Secretary took no action to irritate the industry as a whole, and accepted a Congressional measure cutting his common carrier powers over gas pipe lines crossing the public domain.

President Eisenhower named a conservative Washington state lawyer, Jerome Kuykendall, to be a member, then chairman of the FPC, which has top-to-bottom control over natural gas, in place of a New Dealer. S. L. Digby of Monroe, La., former state conservation commissioner and also formerly a lawyer for oil and gas companies, was his second appointee to the commission. At stake in the appointments was government control over well-head prices of natural gas, the major economic and political factor affecting natural gas. The views of the appointees were not given explicitly, but no natural gas man raised any objection.

The President's February 2 address to Congress implied a hurry-up appeal for ending price controls which was heeded, for petroleum and natural gas, on February 12 after 26 months. As for continued defense controls, the President recommended materials controls over critical items for use by the military, but said the rest, including price, wage and general materials controls, could be allowed to expire. Congress went along, passing a bill to carry on only limited controls.

The Petroleum Administration for Defense, which opened the year with more than 300 persons in its organization and a variety of controls in force, was below 200 by midyear and was headed for a total of 90 late this year. The agency received less than $500,000 for operations for the fiscal year beginning July 1, well below a third of the funds of the preceding year. Authority to ration oil country tubular goods was taken away, but PAD was in sympathy with this, for it had ended the controls on its own, effective at midyear. The big job left to PAD was to help the military get aviation gasoline, make wartime plans for oil and gas and spur on the expansion of the oil industry. Fast tax writeoffs for income tax purposes for enterprises considered essential to national security were continued under the new authority, as were some materials allocation powers.

The Truman administration's suit against foreign oil companies was changed from a criminal inquiry by a grand jury

to a civil action. The new course came after the National Security Council recommended it on January 9, and at the request of Attorney General Herbert Brownell, Jr. to U. S. District Court Judge James Kirkland in Washington on April 21. Mr. Brownell also dropped Anglo-Iranian Oil Co. and Royal Dutch Shell from the action. This left Standard Oil Co. (N.J.), Socony-Vacuum Oil Co., The Texas Co., Gulf Oil Corp., and Standard Oil Co. (Calif.) in the case. The civil proceeding was moved from Washington to New York with the consent of the government. There it takes its place alongside a second civil action, involving some of the same companies, regarding alleged overcharges for oil supplied under the Marshall plan.

Attorney General Herbert Brownell, Jr. also announced formation of a commission to review the nation's antitrust laws. One of its main jobs, he said, was to determine whether the law applies to oil and other companies anywhere in the world, or merely in the United States. The problem arises, he said, because of the oil "cartel" action.

The Congress passed two bills relating to submerged offshore lands. The first bill, signed into law by President Eisenhower May 22, gave the states title and revenues from oil operations out to their historic boundaries. This is three miles in the case of most states, 10.5 miles for Texas and the west coast of Florida. The second bill, completed by Congress July 30, gave the federal government title to and revenue from the outer belt of the offshore lands, the so-called Continental Shelf. Thus ended one chapter in the longest, most wordy battle over a possible vast reserve of oil in modern times. Ahead are several uncertainties. One is just what is the boundary between state and federal land. Another is the threat of court suits against the state title or first bill, promised by Arkansas, Rhode Island and some associations. The threat of suits won't halt leasing, but it is a go-slow sign. A third factor is that many of the best leases have been let out, and fourth is the report from the National Petroleum Council which indicates that costs may be twice those of land operations.

The Eisenhower administration, like the Truman administration, asked Congress for a law authorizing sale of the government's 28 wartime synthetic rubber plants, representing an investment of $700 million. After weeks of hearings, a bill was passed, and after a series of House-Senate compromise efforts, was completed and sent to the White House July 30. A fair price to the government was one concern of the bill writers, and another was whether one or a few companies might win control of too many of the plants, thus trending toward monopoly. As the bill was completed, it provided auction of the plants to the highest bidders. The sales would be concluded by January 31, 1955 at the latest. Any and all sales agreements could be vetoed by the Congress, and the Attorney General must render a finding that the sales are in accord with the antitrust laws.

Present operators of the government's plants are expected to be among the bidders. Petroleum companies now operating the plants include: Phillips Petroleum Co., two Borger, Texas plants; Humble Oil and Refining Co., two Baytown, Texas plants; Esso Standard Oil Co., Baton Rouge, La. plants; Cities Service Refining Corp., Lake Charles, La. plant; Neches Butane Products Co., Port Neches, Texas plant; Sinclair Rubber Co., Inc., Houston, Texas plant; Shell Chemical Corp., Los Angeles, Calif. plant; and Standard Oil Co. (Calif.), El Segundo, Calif., plant.

The dispute over the volume of petroleum imports opened early in the session, as coal interests and some American oil producers began asking Congress for a law to curb them. The drive took on steam as the end of price controls failed to bring a general crude oil price increase. Rep. Richard Simpson, R., Penna., introduced legislation to limit crude oil and products imports to 10 percent of domestic demand, about 730,000 barrels daily, and residuals to five percent, or about 86,000 barrels daily. During four days in May, oil and coal producers urged the Congress to enact the law, and heads of some of the major oil companies teamed up with jobbers to oppose it. President Eisenhower and all his Cabinet expressed opposition to the law and the oil quota bill was defeated 242 to 151 on July 23. This ended the battle for this year, but President Eisenhower promised to set up a commission to study this and other foreign trade matters. Thus, the struggle to curb oil imports may be resumed next year.

At the behest of Secretary McKay, Congress swung the economy axe on a favorite New Deal activity of the government—synthetic liquids fuels experimental work. The coal-to-oil demonstration plant at Louisiana, Mo. received $347,000, but only to close down operations, instead of the $3,737,000 appropriated the year before. The Rifle, Colo., oil shale plant got $1,541,204; the Morgantown, W. Va. coal gasification plant $857,000; the Laramie, Wyo. shale research plant $482,300; and the Bruceton, Penna. coal-to-oil research plant $1,445,200. Overall, the program received less than $4 million against about twice that sum a year earlier. A major argument for the action came from the National Petroleum Council, which reported synthetic fuels uneconomic. The costs, said the NPC, are 14.7 cents a gallon for gasoline from oil shale; 29.4 from coal gasification; and 36.3 cents a gallon from coal hydrogenation. Gasoline from crude oil costs 13 cents.

The first general rise in petroleum prices in five and a half years touched off a Congressional investigation of the industry. On June 9, Socony-Vacuum Oil Co. led the way with higher product prices, and other companies followed. On June 15, Phillips Petroleum Co. offered 25 cents a barrel more for crude oil, and other companies matched this. Then Esso Standard Oil Co. announced a second product price increase and other companies followed suit. The crude rise spread to Venezuela, then to the Middle East. As usual, complaints came to Congress about a one to two cents higher price for gasoline, and Congressmen saw this as a $600 million a year increase to consumers.

Chairman Charles A. Wolverton, R., N. J., of the House Commerce committee, opened hearings that lasted through July, and laid plans for hearings later in the year. Chairman Wolverton has been a critic of the industry before, with no concrete results, and few expected more than talk from this hearing, however annoying it might prove.

A new inquiry into crude oil and products is in the offing from a Senate Interior Subcommittee under Senator George Malone, R., Nev. He has $37,500 from the Senate to look into raw materials supplies and says this will include petroleum. Open hearings are expected.

The next step in synthetic petroleum, whether the government will withdraw further or expand, is to come next year. Again, a revision of the antitrust laws may be asked by the Attorney General as a result of the commission study. A new battle over petroleum imports is promised. This may be the most important oil subject of the next session. A bill to transfer oil and gas authority to the Department of Commerce is in the hopper.

The list will grow as time goes on, for petroleum, like weather, is always a topic of conversation in the halls of Congress. Unlike the weather, however, many in Congress feel the urge to attempt to change petroleum by passing laws.

The rusted remains of the coastal vessel "Kwinana," wrecked on this desolate stretch of coast in 1920, which gave its name to the area in which Anglo-Iranian's new refinery is to be built.

OIL TO LEAD INDUSTRIAL GROWTH OF WEST AUSTRALIA

By T. A. G. Hungerford

ONE NIGHT in 1920 the Western Australian coastal vessel "Kwinana" lay at anchor in Gage Roads, off the mouth of the Swan River. She had already suffered severely from a fire which started below her decks in the north coast port of Carnarvon, but worse was in store for her. During the night a gale sprang up. "Kwinana" broke loose and drifted helplessly until she grounded on the shore of Cockburn Sound, about 12 miles south of Fremantle. She lay there for years, a total wreck. Weekend tents and then shacks began to spring up in the sandhills near her and the area became known as Kwinana.

Prior to 1941 part of the hulk's superstructure was sold to the Japanese as scrap and during the war she was used by the RAAF as a bombing target. The hope expressed in 1912 at her launching that "her enterprises would bring prosperity to Western Australia" must have taken on a hollow ring. Yet, it is coming true.

After a long while, and in a roundabout way, "Kwinana" has become the talisman of a great industrial expansion in store for Western Australia.

Within three years the shores of Cockburn Sound, described over 100 years ago by Captain Stirling of the Royal Navy as the best anchorage on the western coast of Australia, will be transformed by the erection of a £A40 million ($90 million) refinery in the name of Australian Petroleum Refinery Ltd. This is a subsidiary

Artist's impression of the proposed Kwinana refinery to be built on Cockburn Sound near Fremantle, Western Australia.

company of Anglo-Iranian Oil Co. Ltd., London, which has been formed to construct and operate the refinery in Western Australia, where its management is located.

The site is considered almost perfect for the purpose. A large area of flat land, covered only by the lightest of coastal scrub, well above sea level and having excellent bearing qualities, lies directly behind the beach, with deep water reaching close inshore. The whole stretch of 17,000 acres forming Cockburn Sound is virtually landlocked, as the coast south of Fremantle sweeps in a wide curve to Point Peron and a series of islands, Garden, Carnac, Rottnest and others, runs northward from Point Peron paralleling the coast to a few miles north of Fremantle. It offers splendid facilities for maneuvering, at any stage of the tides, the giant 28,000 and 32,000 ton tankers that will berth at the oil port.

Commonwealth Oil Refineries Ltd., owned by Anglo-Iranian Oil Co. Ltd., operates Laverton refinery in Victoria, but it supplies only 120,000 tons of Australia's present yearly requirements of 5,500,000 tons of oil products. London had long intended to increase its refining capacity, but the loss of Abadan resulted immediately in the uneconomic transport of oil from the Western Hemisphere with consequent dollar expenditure. So the company expedited its plans and decided to build a large refinery in Australia with the minimum loss of time and with the full support of the British and Commonwealth governments.

Experts from England, helped by Western Australian authorities, chose the 900-acre site at Kwinana over a number offered in various parts of Australia. It can be easily connected by rail to both Perth and Fremantle and the existing excellent road connections will be supplemented by a new North-South highway. On this site, crude oil from the Middle East will be refined and the products shipped in smaller tankers to other ports of Australia and to New Zealand.

C. H. E. Rebbeck, for the past four years resident engineer at the company's Grangemouth refinery in Scotland, has been appointed to a similar position at Kwinana. He will supervise construction by the contractors.

M. W. Kellogg Company and its British subsidiary, Kellogg International, are the main contractors in association with a number of British firms registered in Western Australia as the Kwinana Construction Group Pty. Ltd. All are experienced in the erection of oil refineries in many parts of the world and have operated alongside each other at a number of sites in the United Kingdom. Australia, though a latecomer in the field of oil refining, thus has the advantages of the accumulated knowledge and techniques of the great overseas undertakings.

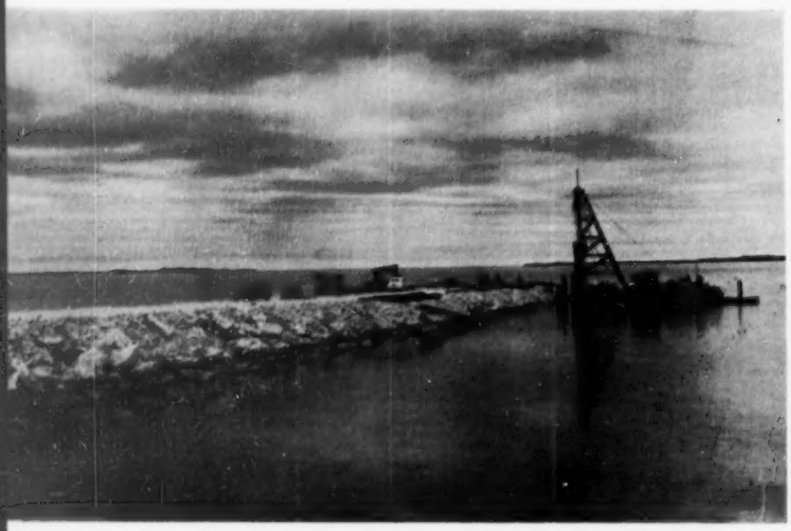
A conservative estimate of the materials that will be required for the erection of the Kwinana Refinery gives an idea of the scope of the work. They include 25,000 tons of steel for tankage, 15,000 tons of steel for pipes and tubes, 11,000 tons of structural steel and 3,500 tons of reinforcing steel, 7,000 tons of cast iron pipes and fittings, 20,000 tons of cement and 1,500,000 bricks.

So far as possible, orders for these materials are being placed with Australian firms. Apart from orders being placed in Western Australia, a purchasing office has been set up in Sydney to effect and coordinate purchases in the eastern states for shipment to the refinery site.

Nearly a quarter of the estimated cost of construction will be represented by wages paid in Australia. The labor force will number about 1,000 at the end of the first six months, rising to a peak of about 3,000 a year later. It will then fall away gradually to the permanent establishment of probably 1,200.

The three million tons of crude oil to be refined yearly are expected to meet the requirements of Anglo-Iranian's distributing associates in Australia and New Zealand as well as the company's bunkering trade throughout Australia. Principal products of a year's refining will be 660,000 tons of motor spirit, 1,550,000 tons of fuel oil, 240,000 tons of diesel oil, 200,000 tons of gas oil, 60,000 tons of aviation turbine fuel and 60,000 tons of tractor vaporizing oil. With all this, the plant allows flexibility in meeting seasonal and varying demands for light and heavy oils.

This rubble jetty, 60 feet wide, 550 feet long and 10 feet above low water level, is the first step in construction of the 1,700-foot permanent jetty to accommodate tankers bringing oil from the Middle East.



The earthmoving equipment above is forming embankments, later to be topped by crushed limestone and bitumen, for bays to accommodate the five main units of the new plant.

It is planned to make Kwinana an original. It will not be a copy of any of the many refineries operated throughout the world by Anglo-Iranian since it is being developed to produce a specific range and quality of petroleum products to suit the particular market demands of the Australasian area. Each process unit, for instance, will be unique and the general layout of the various sections, from jetties to tank farm, from boiler house to separators, is of a new and original pattern.

In New York and London 500 engineers and draftsmen are now producing the 10,000 blueprints indispensable to this stage of the undertaking. It is even a problem, in this time of comparative material shortage, to spend £A2 million ($4,500,000) monthly as the company had planned.

The refinery project consists of three major elements. First, the refinery with its ancillary services, with a capacity for processing three million tons of crude oil yearly; second, the port, capable of handling the importation of three million tons of crude oil yearly and exporting finished products by tankers; and third, a complete township to include homes for the company's employees, together with amenities, shops, satellite industries and all normal municipal facilities.

The refinery plant will comprise five main units designed in accordance with the most up-to-date practice. Two atmospheric distillation units will separate the crude into gasoline, kerosine, diesel and fuel oils, the bases of finished products. A vacuum distillation unit, a catalytic cracking unit for manufacturing high-grade motor spirit from heavier types of oils, and a Platforming unit will complete the refining plant.

In operation, the refinery will produce 2.77 million tons of refined products from the three million ton input of crude oil. The remainder is to be used for steam raising purposes; the three million pound hourly output of four water tube boilers will be used within the refinery.

Hourly, an average of 2,500,000 gallons of water will be taken from the sea for cooling processes. After circulation, it will be discharged into Cockburn Sound, maximum precautions being taken that no oil be allowed to escape into the sea water. It is estimated that when the refinery is completed, three million gallons a day of fresh water will be needed for steam raising and other purposes.

Over 60 large tanks for the storage of refined products will be built on a tank farm adjacent to the refinery. In the port, jetties are to be constructed capable of accommodating simultaneously three of the 32,000-ton deadweight tankers now being built for the British Tanker Co., Anglo-Iranian's shipping organization. The shipping company, with 155 tankers, a further 28 on order and many on charter, operates one of the largest privately owned tanker fleets in the world.

One of the first big construction works on the refinery site, a rubble jetty 60 feet wide, 10 feet above low water level and extending 550 feet out into the deep water of the Sound, was completed recently nearly four weeks ahead of schedule. A fleet of heavy trucks, running on a tight roster, shifted some 20,000 cubic yards of limestone from quarries at Spearwood, about six miles distant. The work was pushed forward seven days a week and in the final few days over 1,000 cubic yards of materials were carted daily.

Directly behind the jetty, a couple of hundred yards from the beach, a casting yard has been constructed. There, steel piles will be prepared for use in construction of the 1,700-foot permanent jetty.

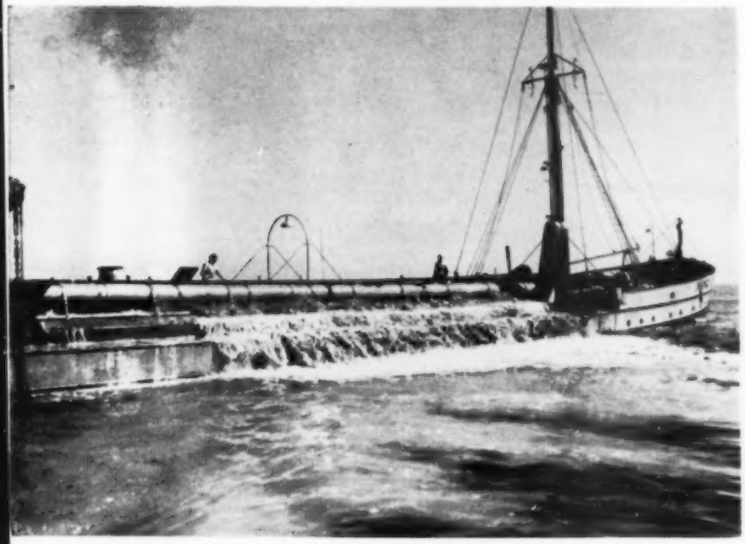
Pile drivers are at present busy on the construction of a wooden jetty head at the end of the rubble causeway. The piles will be transported by rail to the jetty head and then loaded onto pontoons to be carried out to the site of the permanent jetty.

Although work has not yet begun on the building of the refinery, the site wears an entirely different aspect to that which confronted Captain Stirling more than a century ago, although, until the bulldozers of Anglo-Iranian began work in January, it had altered very little.

The entire site has been enclosed in an open mesh fence four miles in length along the thick stands of wattle that covered the area. Those parts needed for immediate construction purposes have been cleared by flattening the undergrowth and raking it into windrows for burning. A minimum of clearing has been done in order to reduce the dust nuisance.

Temporary construction offices containing some 50 or more rooms have been erected near the center of the site and

One of two self-propelled suction hopper dredges at work dredging channels through Success and Parmelia Banks. When the spoil is sucked up, the silt sinks to the hopper bottom and the water returns to the sea.



The government of Western Australia has undertaken to erect 1,000 homes for the oil company employees within three years. Here, cottages are being built at Medina townsite, a mile from the refinery site.

are occupied by personnel of the Australian Petroleum Refinery Ltd. and the contractors. A construction camp to house 400 men, each with a separate room, with toilet and laundry facilities and a canteen, is nearing completion opposite the main gateway of the refinery site.

Numerous buildings of a temporary nature include construction warehouses, cement store, time office and workshops for carpenters, boilermakers and the scores of trades engaged in building operations. In the main warehouse area limestone has been rolled in to make a large flat yard and on it stocks of tank steel, reinforcing steel and other building materials are accumulating.

Nine miles of roads in the main refinery site have been laid out and constructed by the Main Roads Department of Western Australia, forming a definite pattern on the flat terrain. Tractors, bulldozers, graders and all types of earth-moving machinery weave ceaselessly across the scene and the bays to accommodate the different component parts of the refinery are, one by one, emerging from the initial chaos.

The advent of so important an industry will, it is predicted, set off on the shores of Cockburn Sound an era of industrial expansion. Already, on a site adjacent to that of the refinery, the first steps have been taken for the establishment of a £A3 million ($6,750,000) sheet metal rolling mill for one of Australia's greatest industrial concerns, Broken Hill Proprietary Ltd. A £A2 million ($4,500,000) cement works is planned by the Cockburn Cement Pty. Ltd. to be erected only a mile or two away from the refinery.

Medina townsite, nucleus of a future city, has been laid out in an area of well-wooded rolling sandstone ridges a couple of miles west of the refinery site.

The state government took charge of its planning and undertook to provide 1,000 houses for the oil company within three years. Since it is not the policy of the refinery to create an "oil town," the houses are being erected, not in a solid block, but scattered among the trees which, as far as possible in the clearing operations, have been left standing. The first houses are now ready for occupancy, and it is estimated that before the end of the winter 300 will be completed.

For each of the four units comprising the townsite, a large administrative and shopping center is planned. The first shops are completed to coincide with the occupation of the first houses. Road systems have been planned to afford maximum safety to traffic, no one road crossing another, and ample open and recreational space for children, adults and sporting activities has been allowed.

A measure of the expected growth of the town is provided by the known fact that wherever a refinery has been built by the Anglo-Iranian organization, the population of the nearest town has practically doubled in 10 years, mainly as a result of the numerous subsidiary industries attracted by the refinery.

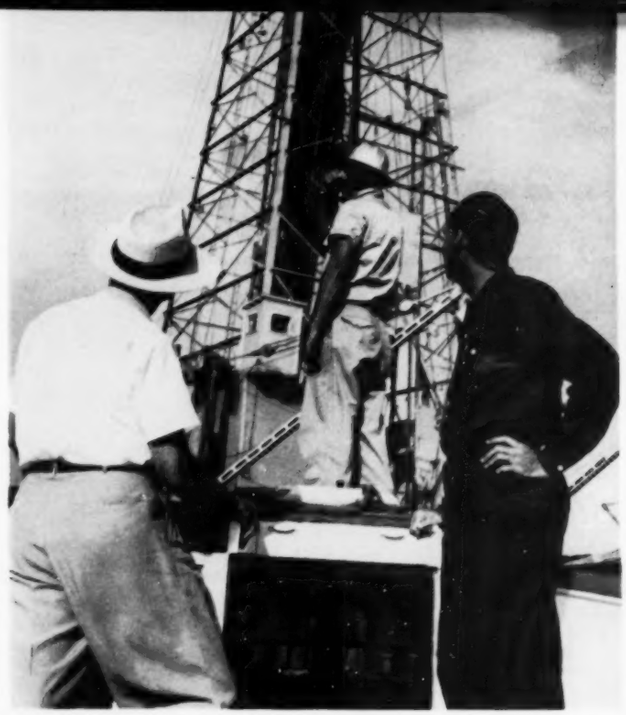
While the bush behind the refinery site is being prepared for the development of a town, the bed of Cockburn Sound in front of it is being dredged to accommodate the great tankers of the company's fleet.

The Parmelia and Success Banks, which extend almost at right angles from the coast between Fremantle and Woodman's Point, five miles south, at present block the way to the new jetty. A Dutch dredging firm, the Hollandse Aanneming Maatschappij, has undertaken a £A2 million ($4,500,000) contract with the state government to provide access.

By the end of March 1957, two channels 38 feet deep, 500 feet wide at the bottom and 4½ miles long will have been dredged. By then the two suction dredges committed to the job will have shifted seven million cubic yards of material. It is all to be dumped in three spoil grounds, deep holes in the Sound bottom where it will not interfere with shipping. The dredges are working two 11-hour shifts over a five-day week, moving 12,000 cubic yards of material a shift.

At present Fremantle accommodates an average of three ships a week from American and United Kingdom ports, unloading cargoes of plant and materials for the new refinery; other ships will bring fabricated steel in the form of tank plates, main power transformers and other items from the eastern states.

Nature has provided an attractive setting for the Kwinana development and Australians are working with energy and enthusiasm to add the utilitarian features which they feel confident will lead to the creation of a great industrial center in Western Australia.



Weatherman Nash Roberts, right, observing one of the huge floating drilling rigs in the tidelands area of the Gulf of Mexico just off the Louisiana coast. Photos by Lloyd Dale.

OIL AND WEATHER IN THE TIDELANDS

By Marshall K. McClelland

IT IS A STRANGE fact, upon first examination, that a consulting meteorologist (private weatherman) should hold one of the key positions in the drilling and production of oil wells in the tidelands of the Gulf of Mexico.

It is true, however, that one of the largest oil companies in that area governs its entire tidelands operation on the basis of the weather reports and forecasts rendered it by one Nash C. Roberts of New Orleans, La. At times the company has gambled millions of dollars worth of equipment on the strength of a Roberts prediction on the course a hurricane would take. On other occasions, they move drilling barges valued at a half million dollars each through tricky bayou sloughs only when Roberts tells them the wind and the waves will be right.

This major oil company, by its request unnamed here, pioneered exploration and drilling in the Gulf of Mexico over 25 years ago. Year by year, as its investments in men and machinery grew in size, its management took every precaution to protect both men and machines from the ravages of the Gulf's fierce tropical disturbances.

The company early realized that its sources of weather information were not infallible. It needed "personalized" service, someone in a position to provide constant, accurate information regarding the highly dangerous "small disturbances" that are native to the Gulf of Mexico, whipping up without much advance notice and taking off in various directions at terrific speeds. These "small disturbances" do big damage when they catch Gulf inhabitants unprepared. They are primarily the product of the great air mass which covers the Gulf and which also affects the weather throughout the United States and lower Canada.

The oil company appointed one of its executives to the task of investigating every possible means of securing the exact service needed. For three months, the officer toured the country, interviewing weather experts and investigating all types of weather service.

Time and again, the name of Nash C. Roberts was brought to his attention. Since Mr. Roberts was already located in New Orleans, right on the Gulf's border, he had the advantage of close acquaintance with the vagaries of Gulf weather. In the checking of his background, the oil company discovered that Mr. Roberts had compiled a record ranking him as one of the top meteorologists of the nation.

Mr. Roberts entered his profession in 1941, when he successfully passed a federal examination for a meteorology instructorship. At the somewhat tender age of 23, he became an instructor at Loyola University of the South in New Orleans. His teachings and writings, still being reproduced in pamphlet form, were of such quality that they came to the attention of Secretary of the Navy Frank B. Knox. The war was under way and the Navy needed assistance in its meteorology training program.

After completing the organization of this vital program, Mr. Roberts enlisted in the Navy and went to the Pacific theater of operations, where he became a combination meteorologist-navigator. He was the first to take a four-engined plane through the "eye," or exact center, of a typhoon. The military used his weather forecasts to coordinate attacks against Japanese-held islands, going in under cover of bad weather when the enemy was off guard.

Back in civilian life after the war, Mr. Roberts went into business in New Orleans for himself in 1947, and steadily built up his reputation for private weather reporting and forecasting.

In 1950, he added the oil company to his growing list of satisfied customers. The company undertook to give Mr. Roberts an extensive indoctrination on its methods and on the extent of its operations in all phases of tidelands development. First came a series of conferences with the executive heads of the various departments. Next came a trip to the Gulf and a long study of the equipment being used in drilling and pumping, and the relationship of the weather to each piece of machinery in its particular function.

For instance, some of the huge drilling barges ride low in the water. They cannot withstand broadside waves in excess of five feet in height. Winds that move at a speed of 30 miles per hour or over whip up waves measuring over the danger mark. Wind velocity therefore becomes an important part of the information to be supplied.

Additionally, wind direction is vital. In the bayou swamp-lands bordering the Gulf along Louisiana's southern coast, the oil company moves drilling and pumping equipment on barges via the shallow sloughs and lakes of that area. In some of the sections, a north wind will blow the water almost completely out of the sloughs, leaving the barges stranded high and dry. In other sections, an excessively playful southwesterly wind can whip up high waves capable of flooding and sinking the barges quickly.

If precautions are taken in time and the proper courses charted, this same wind can be utilized in moving the barges more rapidly than under ordinary circumstances

from one location to another. All such movements and all temporary anchorages are directly guided by Mr. Roberts' advance predictions. In these matters, his word is all-powerful. With a barge and its equipment valued at roughly a half-million dollars up to an even million, there must be a considerable reason for such faith. There is: Mr. Roberts has never lost a barge for the company.

The most critical period of the year from the weather standpoint is that between July 1 and November 15, known as the hurricane season. In the past three years there have been over a dozen hurricane scares in the Gulf, close enough to threaten the company's equipment. Each scare-time, other companies in the Gulf have pulled out their men and equipment —a costly operation. Mr. Roberts has given his oil client the word to "pull out" only once. The many other times, they remained on the job and did not lose either time or equipment.

When a hurricane threatens, the companies out in the Gulf must make up their minds in a hurry. Sufficient daylight hours are needed to turn off the valves at the pumping wells and for the complete shut-down and securing of the drilling rigs. Then, the men, boats and other light equipment must be brought into safe shelter along the coast. Such an operation costs tens of thousands of dollars aside from consideration of the time element.

To run the risk of leaving men and equipment out in the Gulf is to invite death for the workers and disaster for the machinery. Mr. Roberts is a hurricane expert, wise to the tricks and ways of this monster of the seas. Each time a hurricane is located, Mr. Roberts begins an hour-to-hour study of its every movement as reported through the national weather bureau, the weather stations throughout the Caribbean, and over the radios of ships in the area of the hurricane. His encyclopedic knowledge of the characteristics of these monster storms enables him to wait until the last possible minute before rendering his final decision to remain or pull out.

Mr. Roberts, right, watches preparatory drilling operations aboard one of the huge barges afloat in the Gulf.

A typical day with Mr. Roberts shows how he develops his weather information, which goes out hourly to clients in over 30 different business fields. First thing on the schedule is to pick up the "midnight map" at the U. S. Weather Bureau in New Orleans. This map shows the plotting of the weather trends throughout the continental United States. It is the only map which he does not plot himself in his own office. Once in his office at 6:30 A.M., he proceeds to check his many instruments and then draw up the "6:30 A.M. map." The information which is drawn and marked on this map with multi-colored pencils comes from the barometer; the thermometer; the micro-barograph, an instrument which provides a continuous graph report showing the time of day and the value, or changes of atmospheric pressure; the mercurial barometer, a delicate instrument giving a more accurate air pressure reading; and from two nation-wide teletype service circuits.

These last two named machines report the hourly observations of over 600 weather stations located throughout the United States, Canada and the Caribbean area. They also give reports concerning the humidity, temperature, pressure and prevailing air currents located two to ten miles high in the sky. Meteorologists have determined that these currents are the keys which control weather on the ground months in advance, but accurate predictions based on their movements have not yet been achieved.

Sectional and localized maps are then worked out, including all the information about the weather necessary for Roberts' clients. The oil company receives maps covering each square mile of its area in the Gulf of Mexico and several pages of detailed forecasts concerning the predicted hourly changes for the day of wind velocity and direction, humidity, maximum and minimum rainfall, and the temperature, of course.

If some of those "small tropical disturbances" are blowing around, or if a big storm is imminent, Mr. Roberts maintains a watchful eye on his instruments throughout the day and oftentimes far into the night. Any sudden change or direct threat to the Gulf area brings a rapid-fire telephone call to the company's office in New Orleans. Whatever the information, it is radioed to the Gulf field headquarters and appropriate precautions are taken.

Neither the oil company nor Mr. Roberts will ever forget the first big test of his ability. It was in the year 1950, and a mighty hurricane was thrashing through the Gulf, headed for the coast of Louisiana. Directly in its apparent path stood the bulk of the oil company's tidelands equipment. Several hundred workmen paused in their operation and maintenance efforts to cast a wary eye on the horizon behind which lurked the storm.

Mr. Roberts gives weather data to oil company radioman, who transmits the information to tidelands camps in the Gulf.

Always before, the company had pulled out, taking no chances. Now they sat tight, placing the greatest responsibility of his life on Mr. Roberts' shoulders. The hours whirled by while men in the Gulf sweated, buffeted by strong, but not yet dangerous winds. To them in their "battle-front" position, every dark cloud on the horizon loomed as Eternity. Men in the company's main offices sweated too. They had never sliced the time so thin. All the other companies pulled out.

It was Mr. Roberts, however, who sweated most of all. For 36 consecutive hours he stood by his weather instruments. The hurricane was an exceptionally tricky one. It would move slowly in one direction for a few hours, then rest awhile, change its mind, and move in a different direction. The winds gradually increased to a speed of 100 mph. Then he saw the hurricane start on its way with definite intent.

Grabbing the telephone, he informed the company that they could leave all their men and equipment out in the Gulf, with the exception of the Burwood, (La.) area, located in the delta area of the Mississippi. He predicted that the hurricane would pass close by that location, but then would move on over and go inland around Mobile, Ala., bypassing the most heavily concentrated drilling and pumping area of the Gulf.

As if obeying a guiding hand, the hurricane performed exactly as Mr. Roberts forecast. To the men in the Gulf it was a miracle. To the men in the office, it was justification of faith. To Nash Roberts it was a triumph of knowledge. Now another hurricane season is at hand, but the workers of this company show no concern. Scares or no scares, they will keep right on drilling and pumping, bluffed no longer by Nature's Big Blow.

CIVIL ENGINEER PLAYS A VARIED ROLE IN THE PETROLEUM INDUSTRY

By E. Lawson Lomax

THE ROLE of the civil engineer in the petroleum industry is becoming increasingly important in the large scale operations involved in exploration for, exploitation, and refining and transportation of petroleum and the vast number and bulk of its products.

From the beginning to the end of operations the services both of the consulting civil engineer and the civil engineering contractor are of paramount importance, but so many of the results of this work are hidden from the common view that their importance is apt to be overlooked. It can, however, be stated that many of the great projects developed for the petroleum industry owe their trouble-free operation to the sound fundamental civil engineering which has been embodied in them from their inauguration.

Present day search for petroleum is, in the main, carried out in the more inaccessible quarters of the globe, as in the past. Those easier of access naturally have been developed first. It is in places where the country is totally undeveloped and sparsely inhabited, sometimes by relatively primitive peoples, either nomadic or practicing a primitive agriculture, that the search for petroleum or the development of producing fields is frequently carried out.

Modern means of access to such areas are mostly non-existent, and it is in this direction that the civil engineer's services are first required, whether it be in the location of roadways, air strips or water approaches. Surveys must be made to determine the best routes for such approaches as a preliminary to the construction of the actual facilities.

Ground has to be surveyed for the location of drilling rigs, based on information supplied by the geologists; camps have to be laid out, both for the technical staff, usually imported personnel, and for the helpers drawn whenever possible from the indigenous population.

When and if petroleum is discovered in commercial quantities, the civil engineer's task is multiplied many times. In numerous cases, it has culminated, in addition to the actual requirements of a new oil field, in the planning and building of completely new townships with their attendant roads, water supplies, sewage plants, hospitals, recreation grounds and other public utilities.

Even before the presence of oil in commercial quantities is confirmed, a vast amount of expenditure is involved and a considerable percentage of this is spent on civil engineering work of various kinds.

This work is in many cases far from straightforward, and the civil engineer, both at home and on site, is confronted with many problems which call for the exercise of the highest skill of his profession.

Arising from the general geologic knowledge of the presence of sedimentary rocks suitable for the deposit of petroleum, a decision may be taken for an exhaustive geological and geophysical examination of the territory to be made.

This territory may be sandy desert, devoid of all the necessities of life for the exploring party, but comparatively open to access by modern transport, such being the prevalent conditions in most of the Middle East fields. On the other hand, the territory may consist of dense jungle and swamp, as exemplified by such areas as the Far East and South America, or possibly of areas of much easier access, such as some of the fields in the United States.

Whatever the territory may be, however, some of the first problems to be solved are means of access to the working location, establishment of camp or living quarters for the different grades of employees involved and the means for the supply of commissariat.

In a number of cases, where the problems are not too difficult, this task is left to the geologist or petroleum engineer, even though much of the work comes within the category of civil engineering. In planning out access to the location, the petroleum engineer can receive a great amount of assistance through aerial photographic mapping of the territory, and it is safe to say that much time and money has been saved by explorers for petroleum by the utilization of this modern form of civil engineering which reduces such preliminary work from months to days.

With this preliminary survey at hand, the civil engineer can then decide on the best route to take for the exploring party to reach its proposed working location.

In jungle territory this may entail the cutting of trails or temporary roads from the nearest suitable point where implements of exploration can be landed.

The layout of these routes will seek to avoid transport difficulties, such as the crossing of rivers, ravines or mountains wherever possible, and here again the services of the civil engineer are valuable. In desert territory the difficulties may not be so great nor the time required to reach destinations so long, but tracts of desert covered with loose shifting sand unsuitable for mechanized transport must be avoided, as well as rocky territory which might seriously damage or hamper machines. Civil engineering has devised many methods for overcoming these difficulties, but difficulties still remain in undeveloped country.

The result of the preliminary air survey may be such that land or water transport may not be the best adapted or most economical and that modern air transport can be more advantageously utilized. In such a case, the location and provision of an air landing strip may be the best solution—another problem for the civil engineer.

Access by air to an exploratory party, where feasible, solves many difficulties and reduces work, as personnel, food and water supplies can be rapidly transported from base to working locations by this means, and it greatly reduces the quantity of permanent supplies required.

Should the investigations of the exploratory party lead to the assumption that deposits of petroleum in commercial quantities may be present, the only way to prove this is by drilling, in which case a drilling camp with all its necessary equipment will have to be established. Under most conditions, the transport of heavy drilling equipment by air is not feasible, although it has been done where means were lacking.

Transport of material required for the first drilling camp is preferably by land or water (or a combination of the two) according to which is the more practical. At this stage of procedure limitation of cost is most important, as even though geological indications may seem favorable, only the drill can definitely prove that petroleum is present in commercial quantities, and results may be negative.

It is therefore the civil engineer's task to work out the cheapest practical method for placing drilling and camp equipment in the chosen location with a view to its ultimate expansion should the drill prove the presence of oil and development of the area be decided on.

The civil engineer's work on a modern oil field is of major importance, for there is hardly any side of the organization where his services are not essential.

One of his early duties will be the layout and building of communicating roads, the type of which will depend largely on the nature of the terrain to be covered. On some of the oil fields in the Middle East, this is not a difficult proposition and satisfactory roads can be made by grading and then oil-binding the surface. In some cases, however, it happens that the surface material does not lend itself to oil-binding alone and a bitumen must be used for the purpose.

Another consideration, as contrasted with many roads in developed territory, is that the heavy traffic is all in one direction, so that half of the road is subject to heavier wear than the other. In addition, the extremes of heat and cold experienced between day and night and from season to season make careful choice of the binding material essential if unevenness of the road surface and consequent hard wear on transport is to be avoided.

A well-marked dividing line between up and down traffic is advisable in these developing territories, where it is the usual policy for the handling of transport vehicles to be left to natives in whom the sense of road responsibility and avoidance of accidents is not highly developed.

In addition to the planning and building of roads, transport by rail may have to be budgeted for, which entails a large amount of civil engineering work of a specialized kind, including the building of bridges and cutting of tunnels, as well as provision for protecting the lines against coverage by wind-blown sand or by floods, as the case may be.

Transport of material may be possible by sea or river to a point within reach of the site of operation, in which case the building of wharves and jetties for large or small craft will be necessary, and this may entail the driving of piles to support the structures, which has been the case in the development of many oil fields.

In the prospecting and exploratory drilling stage, living accommodations for personnel will in most cases be of a temporary nature, in the form of prefabricated houses, tents or locally built structures, and such will also be the case with regard to workshops and offices.

The amount and nature of the civil engineering work required in the development of a producing field depends on many factors, among which the following may be noted:

(1) Extent of field and its potential productivity.

(2) Nature of surrounding terrain.

(3) Distance of field from seaboard, river or point at which deliveries can be made to refineries.

(4) Climatic conditions which affect type of living quarters, office accommodations and workshops.

(5) Provision of domestic water supplies.

(6) Sanitary arrangements.

(7) Commissariat for nationals and imported personnel.

(8) Recreation facilities.

(9) Layout of tank storage, pumping stations, de-gassing stations and pipe lines—both gathering lines and export delivery lines.

(10) The layout of air strips or airdomes.

(11) Roads and railways.

The magnitude of *all* these factors, of course, depends primarily on the potential productivity of the field which, as in the cases of some of the Middle East fields, may be as high as 40-50 million tons per year, or as low as one million tons per year, as is the case in many commercially successful fields in different parts of the world.

Again, as is the case during the exploration period, the provision of communicating roads within the territory and also those giving access to the territory is of great importance. With a well laid out system and methods of building which will give roads a long life without excessive maintenance costs, the saving in time and labor as well as in the cost and maintenance of transport vehicles will fully justify the cost of the preliminary investigations required to attain the desired standards.

A very informative manual on the subject of desert roads in southwest Iran has been published by the soil mechanics department of Richard Costain Ltd. It gives a wealth of information on the subject, arising from a thorough investigation of the problem. It does not, however, deal with the layout of individual road systems, as that is dependent on the local topography and is a matter for study on the spot by the civil engineer or civil engineering contractor.

It goes without saying that the problems connected with road building vary considerably according to climate and the nature of the territory. Generally speaking, a drier climate with high temperature is associated with desert countries, while a high rainfall is associated with forests, woods, and vegetation, whether the terrain is tropical or in a temperate clime. Petroleum, however, knows no climatic limitations and is found in all types of environment, so the civil engineer has to cope with all these variations.

Modern practice in the development and exploitation of oil fields envisages control of production to give a long life with maximum recovery of petroleum from the deposits, and a minimum of 50 years for a prolific field is the aim of responsible companies. Therefore, with these considerations in view, the provision of permanent as against temporary housing is the ultimate aim, even if for reasons of expediency a certain amount of quickly erected temporary accommodation is the first requisite.

The townships which have been developed by the oil companies in the Middle East for the accommodation of all grades of employees, both nationals and imported personnel, are models of what can be done in this direction by careful planning and high grade civil engineering, with their well laid-out streets and boulevards, their open spaces, good roads, efficient lighting, and above all, their gardens, with a profusion of vegetation growing in what a few years previously was barren desert.

In addition, there are hospitals, cinemas, theaters, clubs, swimming pools, tennis courts and playing fields. Not the least of the problems connected with the development of such a town-

An aerial view of the Kuwait Oil Company's oil loading installations at Mina Al-Ahmadi, Kuwait.

ship is the provision of adequate domestic water supplies, which may in some cases have to be of two or more different kinds, including potable and non-potable fresh water as well as sea or brackish water.

Efficient sanitary arrangements must also be made for the safe disposal of sewage which, while necessary in temperate climes, is of the highest importance in tropical areas if sickness and consequent loss of working time is to be kept within bounds.

In the planning and preparation of a permanent production center, there are many engineering problems to be dealt with aside from the provision of adequate housing, roads, health and sanitary facilities, workshops and warehouses for the repair of mechanical equipment and storage of spare parts. Location of gathering lines and connection with cross country systems, pump stations and power houses are among the many requirements, as is the selection of the type of power generators and transmission best suited to a particular location.

Where the building of a shipping terminal or a refinery is involved, many additional considerations enter in, such as the ability of a chosen site to support heavy concentrated loads, the nature of the soil and the best means of dealing with natural obstructions that may exist.

Crude oil collected from the wells, after stabilization at a central gathering center if that is needed, usually follows one of three courses on its way to the processing plant where it is to be converted into marketable products. It may be moved through a long distance pipe line to a shipping point or refinery location, be delivered direct from storage to tankers at river or sea berths, or may be moved by shorter lines to a refinery located not far from the producing field.

In the first case, the construction of a long pipe line of up to 30-inch diameter calls for a large amount of engineering, primarily in the routing of the line, later in its construction, and in the selection of sites for the intermediate pumping stations and their layout and construction.

An idea of the amount of civil engineering work involved may be formed if one considers that the latest of these pipe lines constructed in the Middle East by the Iraq Petroleum Co., extending from Kirkuk at the fields to Banias at the ocean terminal, a distance of 556 miles, involved a total cost of about $115 million, even though the route of the new line for the greater part of its distance followed that of previously laid lines and in most cases the intermediate pumping stations were already established and required only enlargement to deal with the added volume conveyed.

In the case of the Arabian American Co., although the producing fields are comparatively near navigable waters, calculations showed that the building of a 30-inch pipe line about 1,200 miles long to the Levantine coast would shorten the tanker haul by 2,500-3,000 miles, and that less steel would be required for this pipe line than would be required to build the extra tankers to cope with the greater sea mileage. Incidentally, another point in favor of the pipe line is the saving of Suez Canal dues, which add considerably to the cost of tanker transport. Thus the building of this pipe line was calculated to reduce the overall cost of transport of the crude oil to its destination either in the Eastern or Western Hemisphere.

In recent years, however, the policy of integrated oil companies has to an extent changed, and many of them have built or are building refineries in the marketing centers, so that much of the crude oil now produced in industrially undeveloped lands is exported in its unrefined condition. This involves the shipment of crude by tankers which may be classed as floating pipe lines.

Tanker loading is mainly carried out at specially built jetties or in some cases from submarine lines laid out to deep water, with buoyed flexible loading lines at the sea terminals. In the former case, the building of jetties for mooring and loading is necessary and in the latter, the building of sea mooring posts.

As an example of the work involved in the construction of loading facilities for the despatch of crude petroleum from an established oil field, the case of the Kuwait Oil Co. can be cited.

This company, which is now producing crude oil at a rate of over 40 million tons *per annum*, has built a T-form jetty which extends 4,050 feet out to sea, the end of the T being 3,717 feet long. It has berths at which eight tankers can be loaded at one time, while in addition there are two submarine loading lines. The total cost of this jetty and the submarine lines with the auxiliary harbor works was in the neighborhood of $12 million.

The majority of refineries in Europe deal with imported crude, as indigenous crude supplies on this continent are insufficient to supply market requirements of refined products. Partly because imported crude has to be handled by these refineries and partly because a large percentage of the refined products can be economically distributed from the refinery by water, most of the new European refineries have been built close to seaboard.

In many cases, land close to seaboard is not the most suitable for this purpose from a construction viewpoint, and a compromise between the cost of erection on ground not entirely favorable and the ultimate saving in distribution costs by choosing such a location has to be arrived at. Other considerations may be the local rating and land costs, the availability of labor and its housing, as well as the facilities for delivery by road, rail or internal water transport.

A description of the sites on which two of the more recently built refineries in the United Kingdom were erected, based upon accounts previously published by WORLD PETROLEUM,* will serve to give an idea of the civil engineering problems involved in their construction.

In the first example, the whole area of the site of about 2,000 acres is covered with marshes of alluvial mud, interspersed with innumerable shallow fleets or ditches, the depth of the water in these varying with the rise and fall of the tide. This alluvial mud has little or no bearing value for surface structures. The sub-surface consists of patchy beds of gravel, varying considerably in area and depth, and very irregular in location, while below this, in variable depths, heavy clay is encountered. These variations in depth have considerably influenced the general layout of the refinery, and have also entailed a large amount of surface preparation before foundation work could be commenced.

Consolidation of the ground was accomplished partly by removal of gravel soil from the higher sections to the lower ones, and partly by consolidation with sand dredged from a bank in the Thames Estuary, pumped ashore as a slurry and allowed to drain. For this purpose, between three and four million cubic yards of earth had to be moved and one million cubic yards of sand pumped from the Estuary.

Owing to ground conditions differing substantially, various methods of foundation structure had to be employed; piling was used where concentrated loads had to be carried; concrete rafts were used where conditions were favorable for these; and in some areas deep excavation was employed preparatory to laying down foundations.

As the general surface of the land is below high water level, a very large amount of site preparation was necessary before building operations could be commenced, which included building of roads, dismantling or re-siting of existing plant, and raising of the general level.

Roads were raised to five feet over the original level, and the general lie of the land was leveled to a surface from one foot to one foot six inches above the existing level. The ground work included the filling of fleets or ditches and other depressions, while the service area was raised three feet. This preparatory operation required 600,000 cubic yards of filling and 100,000 cubic yards of cinders.

Piling had to be used for foundations taking concentrated loads, for which purpose 12,000 compressed piles were cast in site, 600 pre-cast reinforced concrete piles were used, and 200 steel piles

* April 1952, page 54; Refinery Annual, pages 74, 110.

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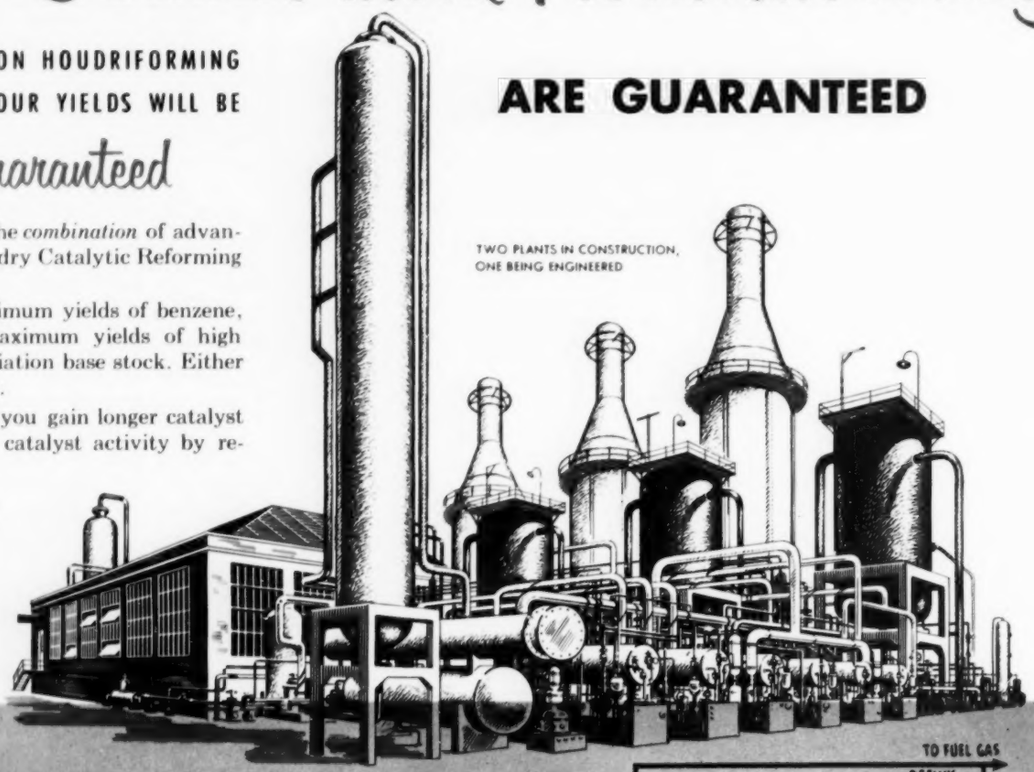
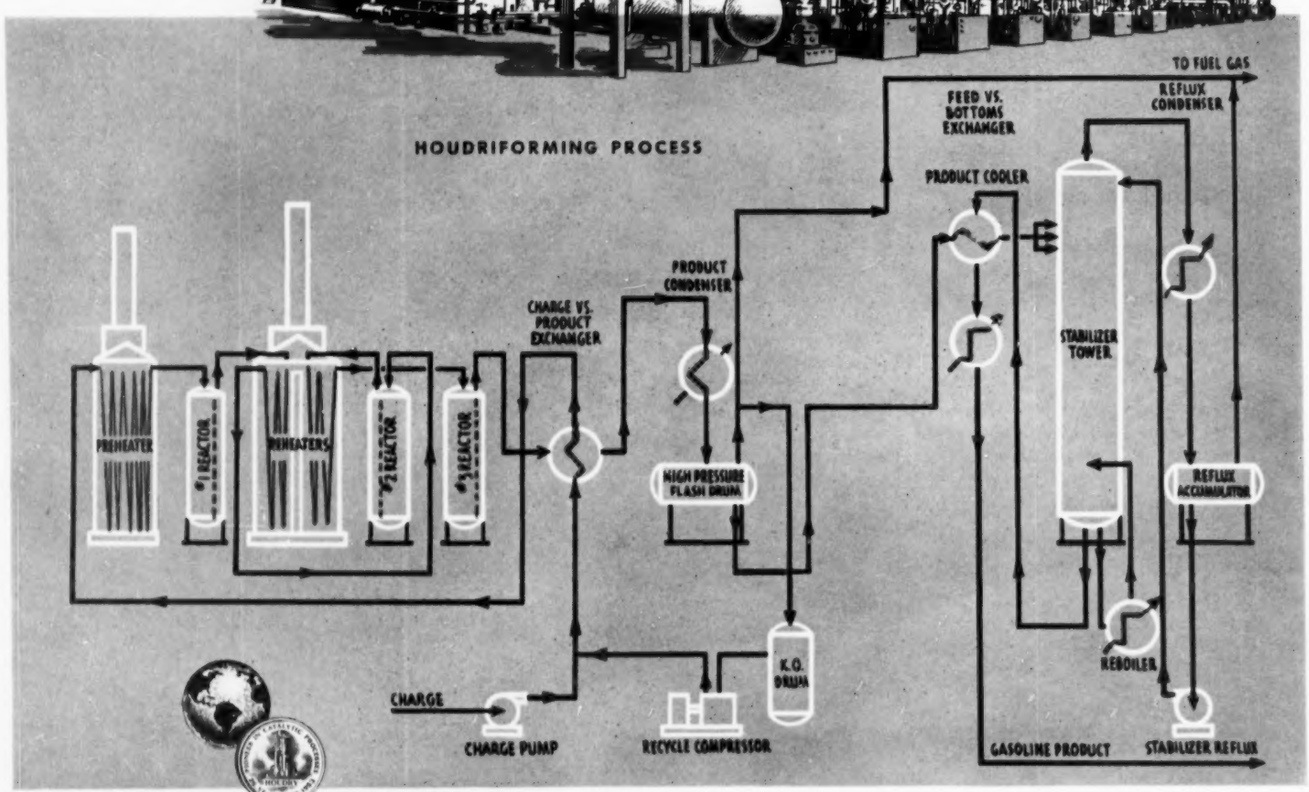


TWO PLANTS IN CONSTRUCTION, ONE BEING ENGINEERED



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in addition to those already in place were used in improving the existing jetties. Foundations required 53,000 cubic yards of concrete and 114,000 square yards were laid for roads and yard area paving.

Riverside works included the provision of a sunken caisson on which a pump house, for supplying cooling water from the river to the refinery, was built, the caisson being so designed that it could be tied in with a future jetty if such was required.

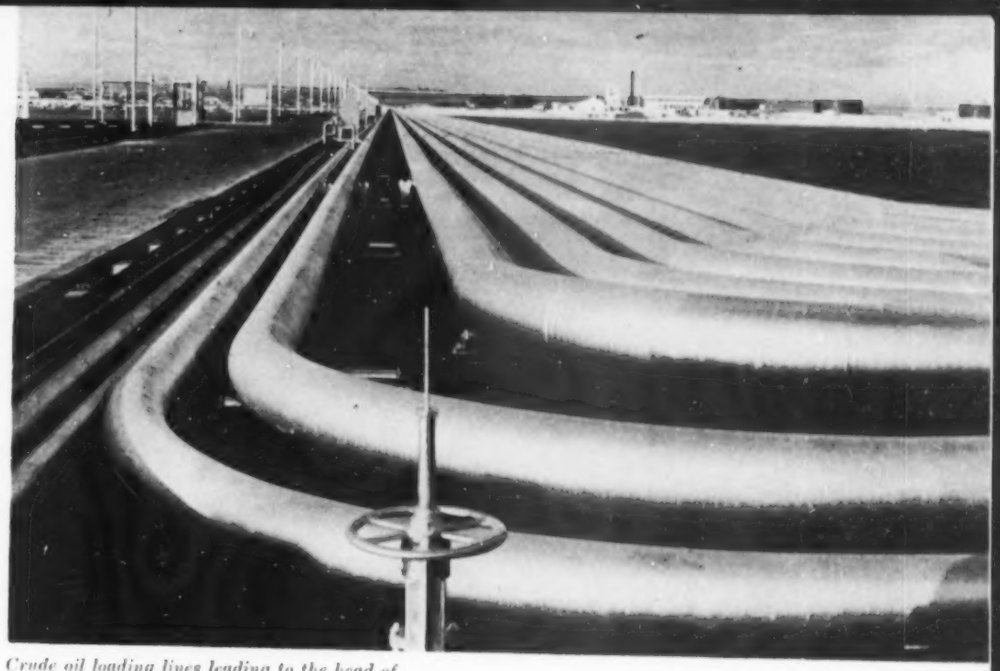
It will be seen from the description of the above sites that a number of very interesting, if difficult, problems in civil engineering had to be tackled, both in the preparation of the ground and in the provision of various facilities necessary for the building of the refinery. These included foundations for the various units, in many of which, such as the distillation units, catalytic cracking plants and reforming plants, the loads were highly concentrated. The choice of sites for these depended both on the nature of the subsurface and also on the optimum layout of the units with regard to continuity of flow of the various products and their economical handling, which led to compromises in some instances.

Tied in with the general layout of the working plant were also the layout of roads and railways, the site drainage, culverts and bridges, open water channels and closed conduits, the marine works of jetties and embarkments, coffer dams and sluices. Each of these various items would be considered in itself a large contract, but all had to be carried out more or less simultaneously and according to program.

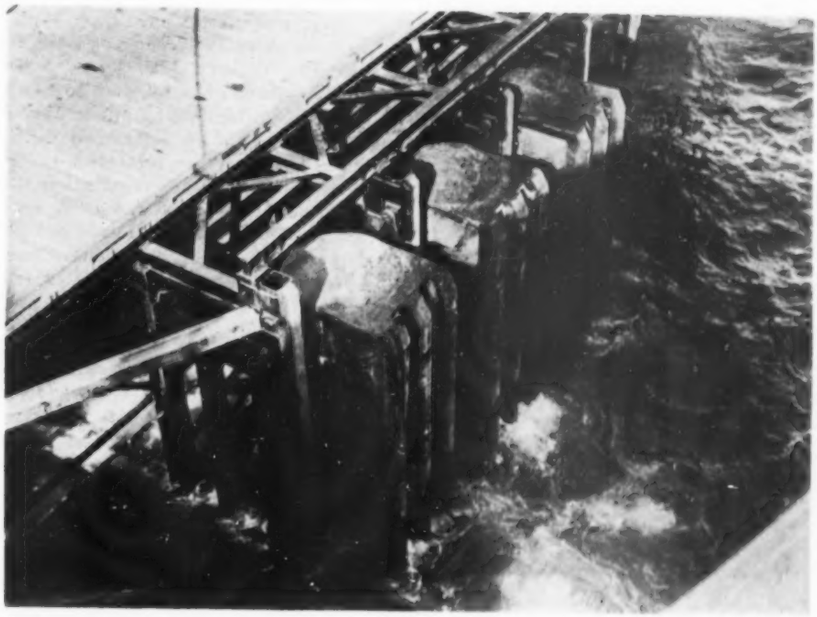
It is estimated that, at the peak of activity, work at the rate of over £100,000 ($280,000) per week was being carried out.

About 3,500,000 imperial gallons of cooling water is required for the working of this refinery, the water being drawn from the river, which at this point is tidal. In order to provide continuity of supply during low water, an 18,000,000-gallon reservoir was made by enclosing part of the foreshore with an embankment one quarter mile long, built with nearly 100,000 cubic yards of clay, and a further 100,000 cubic yards of foreshore mud was dug out behind the embankment to form the reservoir. The water in the reservoir is constantly replaced through tidal valves at high water and if necessary by pumping from a special jetty.

The water flows from the reservoir along a half mile concrete-lined canal, 60 feet wide at the top, to the main water pump house from which it is distributed to the various parts of the refinery. After completing its circulation, the temperature having risen about 60°F, it flows through the separators to remove entrained oil and is then dis-

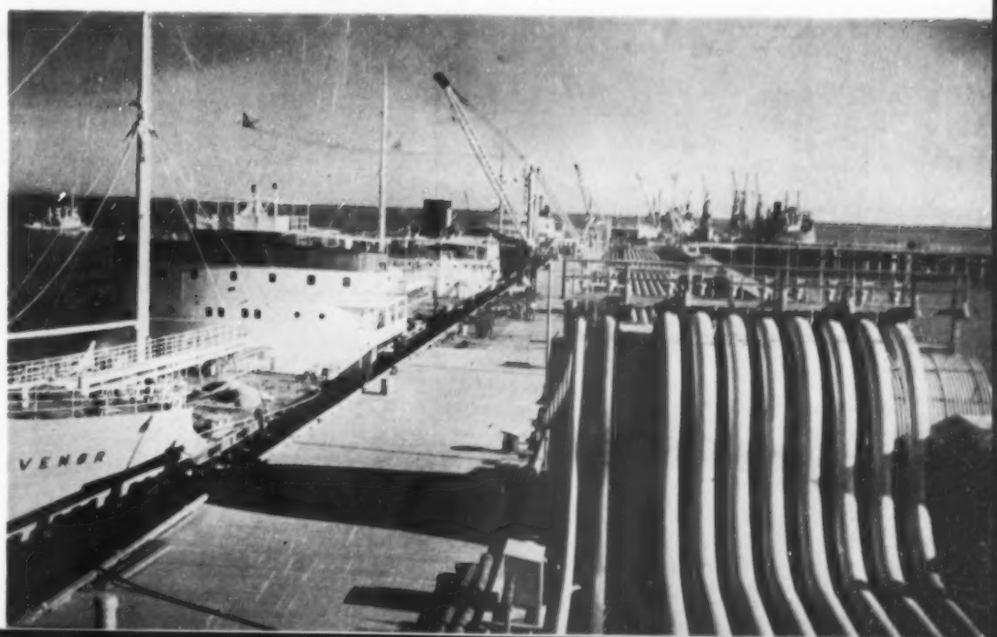


Crude oil loading lines leading to the head of the oil-loading pier at Mina Al-Ahmadi.



Fender at the head of the Kuwait Oil Company's oil pier.

Tanker loading at the head of the Kuwait Oil Company's oil pier.



General view of finished products tankage at Kent refinery, looking southeast.

Tidal intake for Kent cooling water basin, looking west.

charged into the sea at some distance from the intake. The pipes carrying this effluent are laid in sheet-piled trenches up to 15 feet deep, and are of steel, bitumen wrapped and with concrete lining. This lining was done after the pipes were laid, by a machine which travels through the pipe, rotating, spraying and trowelling the liquid concrete at the rate of 200 feet of pipe per day.

All this underground piping, in addition to being bitumen coated, is further protected against corrosion by the installation of a system of cathodic protection.

The outlet of the effluent is over a concrete spillway, constructed in a sheet-piled cofferdam below low water level and some 30 feet deep in the shore mud.

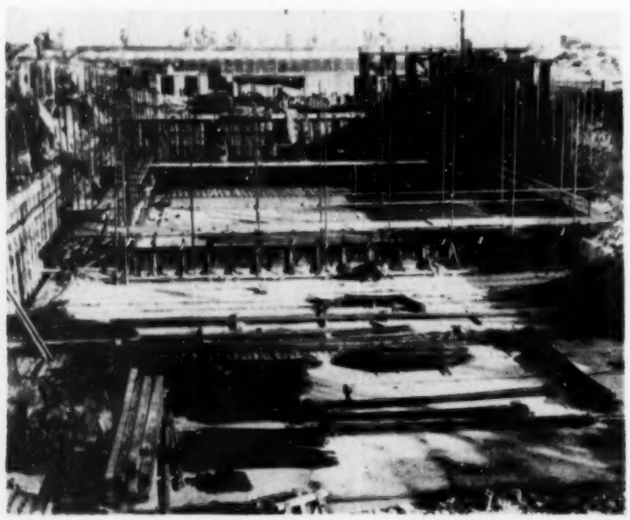
Four new jetties have been built out to deep water to accommodate the largest sized tankers. The jetty construction is of steel box piles up to 130 feet long, driven by floating pile drivers and hearted-up with a reinforced concrete core. There are two reinforced concrete decks to the jetties, one near low water and one above high water. A special feature of the construction of the lower deck was that the steel reinforcements were made in cages weighing between five and six tons and were then lowered following the falling tide into shuttering previously prepared. The concrete was poured into them in advance of the rising tide, the whole operation having to be done in three hours.

Two of the jetties were rooted to the reservoir embankment and it was necessary for this work to be carried out concurrently.

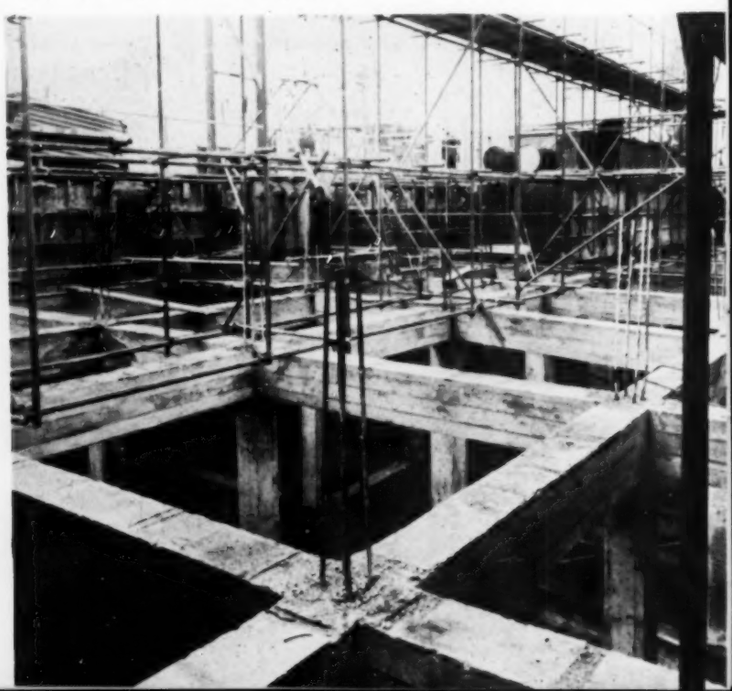
The civil engineering work on the refinery was not confined to the above, as it included also the foundations and building of the boiler house, power house and chimneys. The boiler house contains five large water-tube boilers of 150,000 pounds per hour steaming capacity with their auxiliary equipment. In the power house there are four multi-stage back pressure steam turbo-alternator sets with an installed capacity of 16,000 kw. There are also three high brick chimneys.

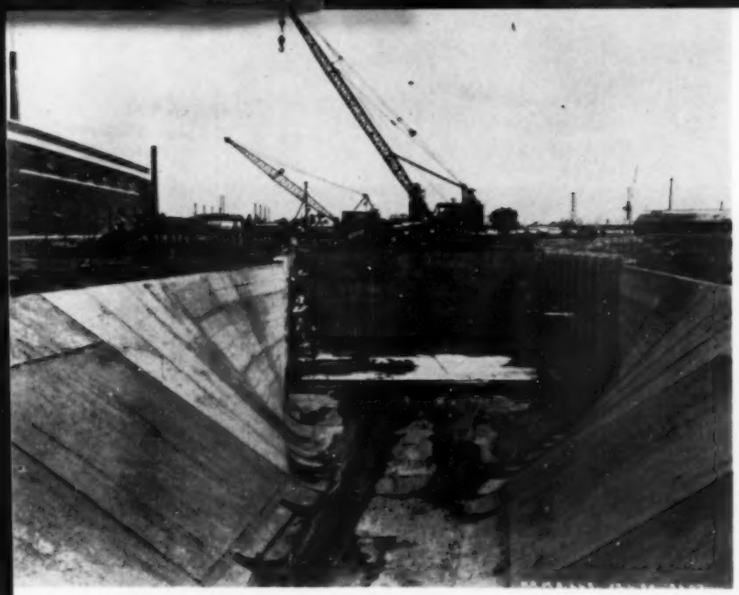
In addition to these foundations are those for the large number of distillation columns which all carry concentrated loads. These columns vary in height from 144 feet six inches to 32 feet six

Steel work going up in the dry dock within which the "Mulberry" dock's construction was started for the Coryton refinery.



Internal bracing of the Mulberry dock unit.





Kent refinery's cooling water channel with main pump house to left.

General view of jetties one and two at Kent refinery, looking east.

inches, in diameter from 32 to three feet.

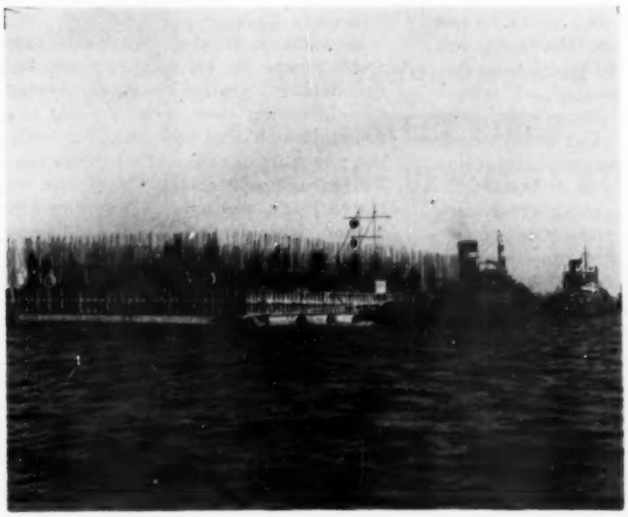
In the building of the refinery, at the peak period, between 3,500 and 4,000 men were employed on civil engineering work alone, many of them drawn from distant places, so far away as to render it impossible for them to travel to and fro daily, so a constructional camp to house some 1,800 men was erected, complete with sanitary arrangements, sewage disposal, fire brigade, hospital, post office, cinema, church, recreational rooms and playing fields—in fact a fully crystallized community. A canteen was built which served meals throughout the 24 hours of the day, as many men were employed on night shifts.

Wear and tear on engineering plant in a project of this nature is very high, so workshops were set up for repairs on the various types of plant, which included some 80 excavators in addition to tractors, scrapers, bulldozers and other earth moving equipment, pumps, compressors, concrete mixers, cranes and hoists.

The preparatory civil engineering work on the second project presented many problems of an interesting nature, as in addition to those connected with jetties, roads, foundations, drainage and sewage, there was the primary problem of site preparation. This site had been used for many years as a public service storage and refining installation, but the tankage, although still serviceable and of value for use, was not located in conformity with the new layout and therefore the tanks had to be moved to their new locations. For this purpose, advantage of the low-lying nature of the site was taken; shallow canals were cut and along these, after flooding at high water, the empty tanks were floated and towed into their new positions. The canals were then drained at low water and refilled with earth in accordance with the general site preparation.

Provision of cooling water for the refinery presented a considerable problem, complicated by a shortage of reinforcing steel rods which at the time was very acute. Under ordinary circumstances a reinforced concrete jetty would have been built out into the river to carry the necessary pumps and screens, but in view of the prevailing conditions, it was decided to have a caisson or "Mulberry type" of dock built and sunk at the required point, a task which was entrusted to John Laing & Co. Ltd.,

Dock unit being towed from Gravesend to Tilbury.



The unit in place today.

Photos above show the dry dock in which the Mulberry unit was constructed being cleared of silt and mud before work could begin.

a well known firm of engineering contractors.

It was not feasible to build this caisson at the refinery site, so a dry dock was obtained higher up the river on which the bottom portion of the caisson could be constructed to a height governed by the depth of water available, the further work being added later in a wet dock. A level concrete screen was laid in the bottom of the dry dock and hollow tiles were placed on this, followed by a layer of building paper upon which the floor of the caisson was laid. Concreting of the floor and side walls was carried out to a height of 12 feet six inches. Eighteen six-inch valves were built in the lower part of the walls to control the flooding of the unit, and after reaching the required height, it was tested for watertightness before leaving this berth for the wet dock.

The structure has an overall length of 100 feet and a width of 53 feet, and is divided into six main compartments. The external walls are one foot six inches thick and there are three longitudinal walls, nine inches thick, and nine transverse walls of the same thickness below the bottom floor slab which is 20 feet above the base. The total height of the unit when located at the refinery was 52 feet six inches, the final four feet and deck unit being added later. There are longitudinal and cross braces 13 inches wide, the lower ones being 32 inches deep and the upper ones being 18 inches deep.

After the caisson had been built to a total height of 52 feet six inches, it was taken from the dock and towed down the river to the prepared site off the refinery where it was to be sunk. Prior to this towage, ballast of 600 tons of lean concrete (15:1) was placed in the bottom below the lower floor to give a designed draft of 29 feet for the towing operation.

After being moored at site 150 feet from the river bank, the valves in the external walls were opened to admit water for the final sinking operation, a further 10½ feet into about 40 feet of water.

In order to consolidate the position on the prepared bed, the caisson was loaded with about 3,000 tons ballast, after which very little further sinking took place.

A steel structure on box piles was built from the shore end to carry the water pipes to the shore, but this is not tied to the caisson. An opening on one side of the caisson was closed temporarily by steel sheet piling which was afterwards removed, steel grids being inserted to prevent entry of obstructions to the pump inlets.

The pumps for the cooling water were located in the caisson, there being two electrically driven pumps and one steam turbine driven pump of 650 hp with a capacity of 15,000 gpm, and two electrically driven pumps and one steam turbine driven pump of 200 hp with a capacity of 6,600 gpm, the former for supplying refinery cooling water and fire service and the latter supplying cooling water for the power plant.

Another civil engineering problem on this site was connected with the disposal of effluent water. The site, which is below high water level, is protected by a sea wall, and in order to avoid damage a channel through river mud had to be made for the water. Owing to prevailing conditions, this could not be dug out mechanically, so recourse was taken to blasting out this channel by means of explosives. The operation was successful and a suitable channel was formed by this means.

A further problem was connected with the erection of parallel-sided self-supporting steel stacks which under ordinary conditions do not require guy ropes. As the layout of the work did not admit the use of these, conical steel stacks requiring no guy ropes were designed and erected and have proved satisfactory.

In addition to these problems there were others in connection with tank foundations. Owing again to shortage of reinforcing steel, new types of tank foundations had to be designed in which the minimum quantity of steel was used. Piling had to be resorted to for concentrated loads, and over 13,000 piles altogether were driven, both reinforced forecast piles and cast-in-situ piles being used according to the load-carrying capacity required.

Many more typical instances of civil engineering requirements in the petroleum industry could be given, but those referred to are intended to suggest the wide range of engineering application demanded by today's petroleum industry.

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His Excellency, Ghulam Mohammed, governor general of Pakistan, delivering address at the opening ceremony of Zin test well.

Heavy metal equipment for the drilling camps being unloaded from freighter aircraft for operations in Papua.

World-Wide Exploration

(Continued from page 75)

first group was headed by Frank Morgan, Richfield vice president, and R. V. Whetsel, manager of the foreign department of Cities Service Petroleum, Inc.

Following geological studies of Israel by Max Ball and W. T. Foran, which suggested the existence of conditions favorable to the presence of oil, drilling tests are to be made by Lapidoth-Israel Petroleum Co. Under a contract made with Kerr-McGee Oil Industries, Inc., a party of 20 experienced American fieldmen and a drilling superintendent left New York in August to start preliminary field work.

For its initial operations, Lapidoth has ordered a Walker-Neer cable tool rig and two IDECO rotary drills, 711, with a full complement of accessories, including spare parts, casing, cementing plant, formation testers, coring equipment, fishing tools, bits and drill pipe of a wide range of sizes for all eventualities. Part of this equipment has reached Israel and G. W. Walton, vice president of Dresser Equipment Co., has announced that the IDECO division has hastened completion of the fabrication and testing of the rigs to enable them to be shipped before the end of the month. Seven separate groups have filed applications with the Israel government for licenses covering thirty-one areas.

Kuwait Oil Co. has developed its large output, amounting now to over 900,000 b/d, from the Burgan field, where the discovery well was brought in during February 1938 and where 131 wells have been drilled. During the past year, drilling has been extended to the Magwa field, which went into production early in 1953. In this area 18 wells have been put down, all of them being potential producers. Geophysical surveys are being conducted in other parts of the country to determine their possibilities.

In the Neutral Zone lying between Saudi Arabia and Kuwait, the American Independent Oil Co., after several unsuccessful attempts, brought in its first producing well early this year. A first step-out test drilled 2½ miles from the discovery topped the Burgan sand at 3,620 feet and found water at 3,698 feet. It is classed as a potential producer of about 1,500 b/d. A third well was spudded in at the end of July.

A spectacular increase in production has been recorded during the year by Iraq Petroleum Co. and its associate, Basrah Petroleum Co. This resulted from the opening of the company's 30-inch pipe line to Banias on the Mediterranean shore and the development of the Ain Zalah field north of Mosul and the Zubair fields in the south. Since the first of the year, the crude output of the Iraq companies has run about 625,000 b/d.

Interest of international companies in Turkey has been stimulated by the progress of development in the Asiatic portion of the country and by the receptive attitude of the government toward the investment of foreign capital. Representatives of several companies, including Standard Oil (N.J.), Gulf and Socony-Vacuum, have recently visited Turkey to gather information on conditions there. A statement by a spokesman for American Overseas Petroleum Ltd., an associate of the Caltex group, published in May last, revealed that J. P. McCulloch, vice president, was in Turkey and that, subject to his report, the company planned to send representatives to carry on geological studies. The Turkish government has retained Max Ball to act as consultant in the development of its plans for petroleum.

Pakistan and India both are seeking to expand their oil production. Pakistan Petroleum Ltd. is engaged in a gravimetric survey in eastern areas to be followed by detailed seismic surveys. Standard-Vacuum Oil Co. has conducted an aero-magnetometer survey of a section of East Pakistan. Photographic Survey Co. of Canada recently completed for the government an aerial reconnaissance of Baluchistan in the west. The search for oil in the Zin mountains of the Bugti tribal territory of Baluchistan began on July 17. In 1952, eight tests were drilled, of which two Pakistan Petroleum wells were gassers. Production of oil increased from 333,944 barrels in 1947 to 1,384,671 barrels in 1952.

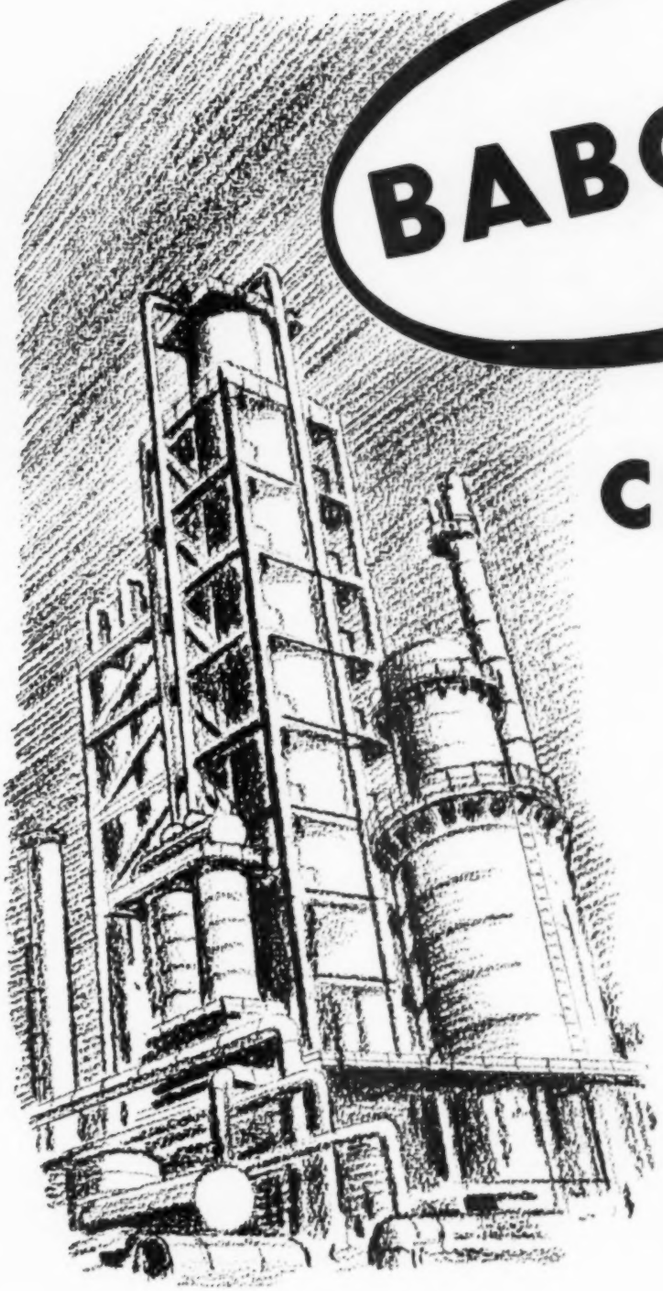
A license for the Zin test was granted last year and since October, a 55-mile road has been built and 4,000 tons of equipment and stores moved in, a camp has been built and a rig erected capable of going down to 10,000 feet.

In the Patharia region, Pakistan Petroleum recently abandoned its No. 4 test below 5,000 feet.

In India, the Assam Oil Co. is drilling a wildcat near Digboi which has found four oil-bearing horizons. Deepening of wells in the Dhulian field has resulted in a gain in production.

Previous exploration in Australia, confined mostly to the eastern states, has not located any fields of prolific production, but a comprehensive survey now is being made of Western Australia, which most geologists consider more likely to contain petroleum deposits. The work is being carried on by Western Australian Petroleum Pty., controlled 80 percent by Caltex and 20 percent by Ampol. The

(Please turn to page 112)



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Babcock & Wilcox Ltd. are playing a vital part in the provision of British-made equipment for Britain's new oil refineries. Their contribution to the new Coryton refinery is a major one, comprising *98 pressure vessels and 30 vertical columns*, for incorporation in the furfural, propane, deasphalting, M.E.K., distillation, percolation and T.C.C. units, and in connection with gasolene treatment, yard piping air supply, propane tankage, thermal reformation and boiler plant. The T.C.C. unit includes a Reactor weighing 60 tons, in size, 47 ft. by 13 ft., fabricated from "Colclad"—alloy-clad steel. Total weight of all these items is over 800 tons; and the vertical columns range in height up to 92 ft.

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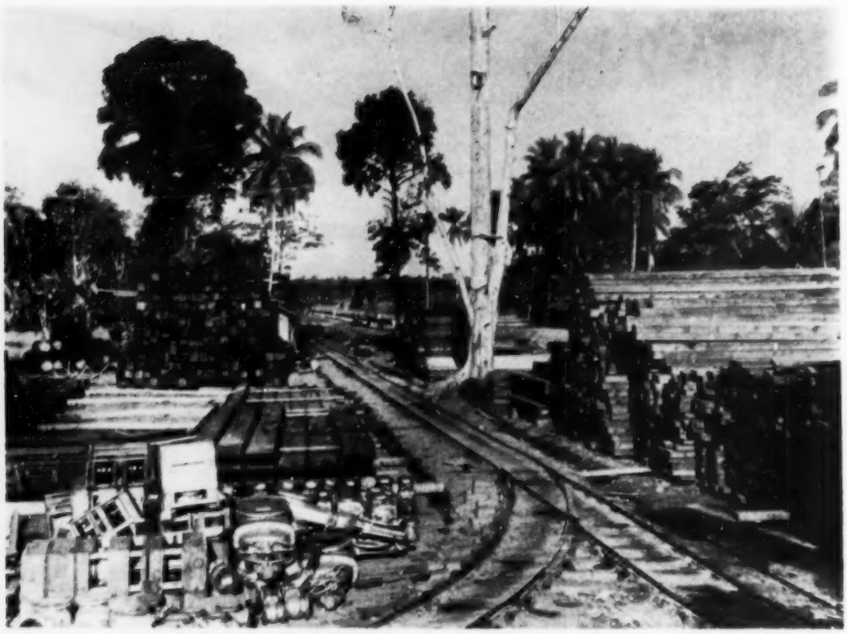
Dredging in Cockburn Sound for approaches to development under way by Australian Petroleum Co. Ltd.



View of the Caltex Pacific Oil Company's storage yard at Pakning, Sumatra, where development of the Minas field is going forward.

concession covers a large area north of Perth extending along the Gulf of Exmouth. Following preliminary surveys, a heavy rig and other drilling equipment has been brought in and a site is about to be selected for the first test which will be drilled by Brown Drilling Co. of California. One shallow test has been drilled further north by another group, resulting in a dry hole, and great interest is centered on the new effort to determine the oil possibilities of West Australia.

Long and expensive exploratory drilling of Australasian Petroleum Co. Pty. Ltd. in Papua still continues without commercial success. Latest wildcat test at Omati had a gas blowout at 13,743 feet which froze the drill pipe. As in other Papuan wells, the drillers have been plagued by caving, mud loss and heaving shale. Thus far the company has spent 11 million Australian pounds in its exploration work.

French interests are drilling a test well in New Caledonia, a South Pacific island near Australia. Soc. de Recherche et d'Exploitation de Petrole en Nouvelle Caledonie, which is conducting the search, is directed by the Bureau des Recherches de Petrole in Paris.

Indonesian activities during the year have centered largely in Sumatra. In the southern part of the island, Shell drilled 43 wells in 1952, of which 38 were producers. Average production at the year's end was 67,000 b/d. Most active drilling was in the Kenali Asam field, discovered in 1931, where 16 wells were drilled last year, all successful. The field is producing 14,800 b/d from 40 flowing wells. In Limau, Shell drilled 12 wells last year of which eight were producers. This was a 1928 Miocene discovery which was not actively developed until 1951. In that year, six wells were drilled, of which four were producers, bringing the total in the field to nine. The 17 active wells at the end of 1952 were flowing 8,000 b/d. A wildcat drilled last year at East Tandjung Miring was a success at 4,507 feet. Production was not undertaken.

In central Sumatra, Caltex interests are proceeding with an orderly development of the Minas field, which now is producing in excess of 40,000 b/d from 69 wells. Two recent finds have been made as a result of wildcatting and one rig is being devoted to step-out drilling for the purpose of determination of reserves in the new fields. Neither of the new discoveries is being produced commercially. Except for Wampu, where Shell drilled a wildcat success, all of Northern Sumatra remained closed to foreign operations during the year.

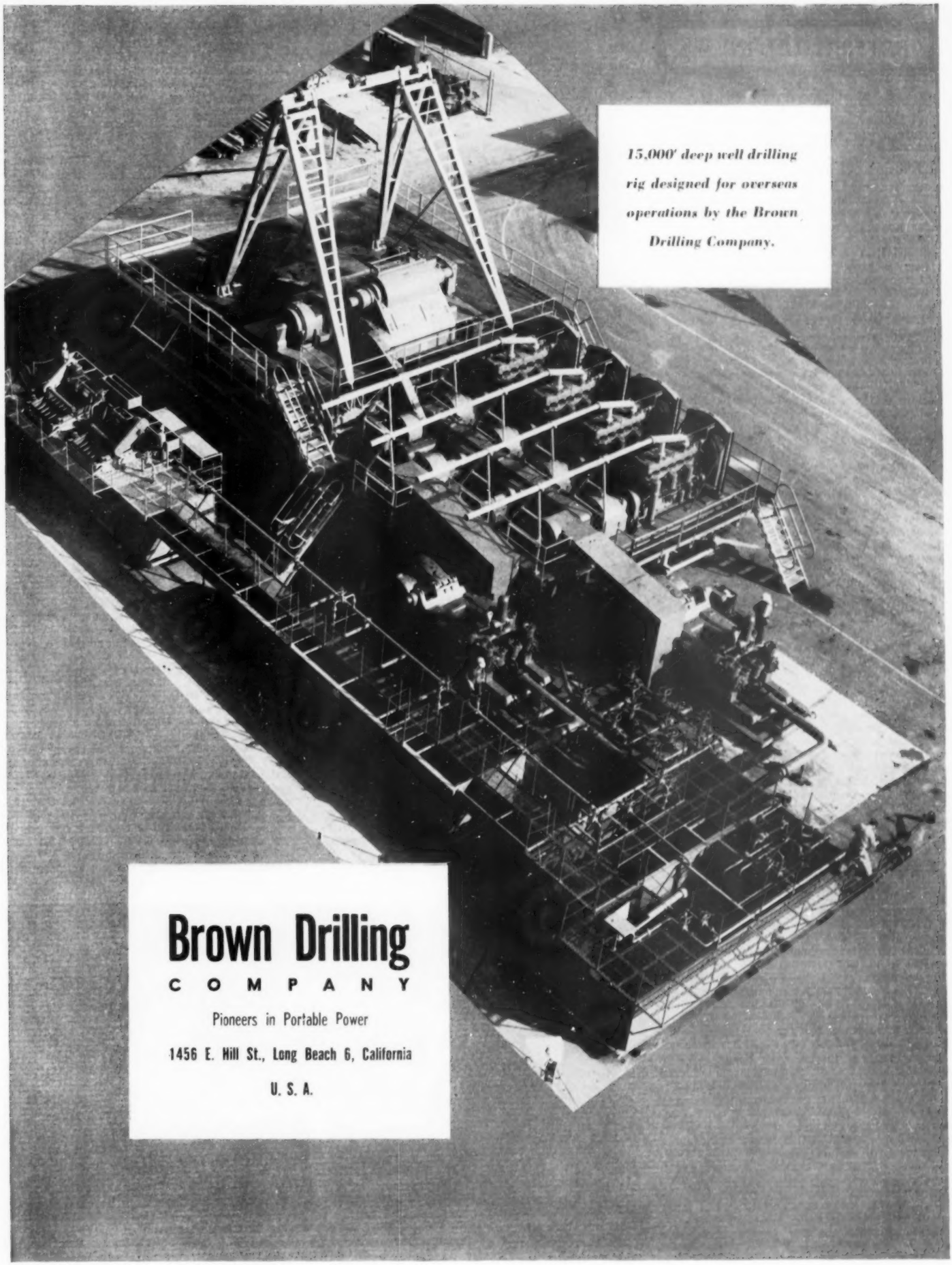
In Netherlands New Guinea, NNGPM drilled 15 wells in 1952. Of these, six were dry and two others were abandoned as noncommercial. Production was taken only from Klamono, where 20 wells produced an average of 4,730 b/d. At the end of the year, output was 4,920 b/d. Wasian and Mogoi fields were shut in. A wildcat was drilling at Klamogoen at the end of the year and a Tembuni test was dry.

In Java, political disturbances limited Shell interests to the operation of two fields in 1952. The Kawengan field produced 12,000 b/d and the Kruka field 950 b/d. In the Kawengan area, seven wells were drilled, of which six were producers.

In the five active fields in Kalimantan, Shell drilled 19 wells in 1952, of which 15 were producers. Combined output of the four fields was 14,800 b/d. Tarakan and Sanga Sanga were the largest fields.

British Malayan Petroleum Co. is continuing active development of the Seria field in Brunei. Six rigs are running. In the latter half of 1952, 10 wells were drilled, of which eight were successful. A gas blowout in a 7,000 foot drilling well earlier this year caused the shutting down of field operations until control was obtained. Offshore drilling has been undertaken by Shell in an effort to extend the Seria field, which now produces about 100,000 b/d. A deep exploration test is being undertaken about ten miles east of Labes. One drilling rig is reported to be in position and site preparation for a second test is underway. Average production in the half year was 102,000 b/d. In the Miri field, Sarawak Oilfields Ltd. was producing a little over 1,000 b/d from 132 wells. There was no drilling activity in this old field discovered in 1911.

Expansion of exploration and production is being accompanied by worldwide activity in the building of pipe lines, tankers, storage facilities and refineries. Additions to refining capacity that will be completed this year, together with new construction that will come into operation in 1954 and 1955, will increase potential world refinery throughput to more than 16 million barrels daily by the latter year, with nearly seven million barrels of this capacity located outside the United States. Details of this development were presented in the Annual Refinery Review Number of WORLD PETROLEUM, published in July 1953.



15,000' deep well drilling rig designed for overseas operations by the Brown Drilling Company.

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BRITISH OIL NEWS

By E. Lawson Lomax

An interesting development in the British petroleum situation during the past month has been the posting of Middle East crude prices by British oil companies operating in Middle East fields, which has followed the general price increase for crude in the United States.

Some confusion with regard to these prices occurred, but they were finalized for the month on the following basis:

Kuwait: $1.72 per barrel for gravity 31/31.9° API fob Mina-al-Ahmadi.

Iraq (Persian Gulf): $1.92 for gravity 36/36.9° API, fob Fao.

Iraq (Eastern Mediterranean): $2.39 for gravity 36/36.9° API, fob Tripoli or Banias.

Qatar: $2.08 for gravity 40/40.9° API, fob Umm Said.

The general increases are relatively small compared with increases which have taken place in other commodities, and are fully justified in the light of increased expenditure in the form of rises in prices of steel and materials fabricated from it, labor and other costs, and it is well within the bounds of probability that further increases must be made in the future unless there is a complete reversal in the trend of commodity prices as well as in income and profit taxes. Pressure towards this end may be expected from the various Middle East governments, with their 50/50 sharing agreements, who will be likely to protest should their share of profits not be maintained or increased. A significant feature of these price changes is a growing tendency to break away from adherence to quotations at Gulf Coast ports of the United States, a trend that presumably will become more pronounced with further changes in the relative position of the two shipping centers.

Llandarcy Expansion Nears Completion

At the Llandarcy refinery of Anglo-Iranian Oil Co., which has been in constant process of growth for the past several years, the current expansion program is now nearing completion. The latest units to be commissioned are the furfural solvent treating unit and the gas oil heating unit. The propane de-asphalting and MEK dewaxing units are to go into service shortly, providing the plant with increased facilities for the manufacture of lubes. First of three turbo-alternators for the new 13,000 kw power station has been completed and the others are nearly ready.

Burmah-Shell Starts Construction on Trombay Island

Construction has begun on the $56,000,000 plant of Burmah-Shell Refineries Ltd. which has been incorporated in India. The plant is being erected on Trombay Island, Bombay, and will have a capacity of 40,000 barrels per day or more.

In connection with the refinery, the Bombay Port Trust is building a new marine terminal at Butcher Island, three miles away, where facilities will be supplied for the discharge of tankers delivering crude oil and for the loading of refined products. Submarine pipe lines will be laid between Trombay and Butcher Island for handling the various oils. Part of the refined prodcomprise atmospheric and vacuum distillation to other parts of India, while part will be pumped direct to the company's installations in the Bombay area and the remainder distributed from the refinery by road and rail to various bulk depots.

Products will include gasoline, kerosine, diesel oils, furnace fuels and bitumen. Lubricant manufacture is not contemplated at the present time. Design and engineering are being carried out by Shell and The Lummus Company. The latter will direct the main erection work. The plant will comprise atmospheric and vacuum distillation units, a catalytic cracking unit, re-run units, gas separating and product treating units.

Middle East Crude Production Figures

Production of crude in in the Middle East by companies in which British capital is interested continues to increase, and during the first six months of the year amounted to 35,655,760 tons.

Production by companies is:

	PRODUCTION JUNE, 1953 (LONG TONS)	CURRENT TOTAL, 1953 (LONG TONS)
Iraq Petroleum Co. Ltd. (Kirkuk Field)	1,934,420	10,986,662
Basrah Petroleum Co. Ltd. (Zubair Field)	232,572	1,457,260
Mosul Petroleum Co. Ltd. (Ain Zalah Field)	111,519	675,884 [a]
Qatar Petroleum Co. Ltd. (formerly Petroleum Develop. Ltd.)	349,128	1,946,366 [b]
Kuwait Oil Co. Ltd.[c]	3,685,975	20,589,588
Totals	6,313,614	35,655,760

[a] January and February figures for this company have deducted 757 long tons from the total previously given.

[b] March production figure previously given as 297,839 long tons has been altered to 298,794 long tons, adding 955 tons to the current total.

[c] Kuwait Oil Co.'s production of 3,684,975 tons for June = 27,268,815 U. S. bbls. Aramco production for 1953 = 26,426,815 U. S. bbls.

U. K. Oil Exploration Continues

Oil exploration in the United Kingdom continues at a moderate rate. The exploratory well at Screveton (about 10 miles from the Eakring field), which is now being drilled by the D'Arcy Exploration Co., has reached a depth of over 3,500 feet and is to be drilled another 100 feet before a final core is taken for examination. No trace of oil has been found thus far.

This company is also drilling an exploratory well at West Drayton, near Tuxford. A depth of 1,942 feet has been reached and the well will be carried to about 3,500 feet. A short distance from this bore a considerable show of oil was found in a hole drilled by the Wigan Coal Corporation in 1940.

Geophysicists of the company are conducting a seismic survey over an area of about 30 square miles to the east of Nottingham and over an area of similar size between Sutton and Tuxford, north of Newark.

Tanker Construction News

According to Lloyd's Register of Shipbuilding, returns for the quarter ended June 30, oil tankers under construction in United Kingdom yards totaled 110 ships of 1,212,052 gross tons, a decrease of 13,725 tons compared with the preceding quarter, representing 57.1 percent of the total tonnage under construction in the country.

Tankers under construction in world's shipyards amount to 306 ships of 3,420,232 gross tons (127 steamships of 1,764,241 tons and 179 motorships of 1,655,991 tons) which is 152,973 tons more than the comparable figure for the March quarter. Oil tanker percentage of the total tonnage under construction in the world increased from 54.4 percent to 56.7 percent.

It was announced by Sir William Fraser, chairman of Anglo-Iranian Oil Co., at the launching of the 32,000 dwt tanker "British Merchant" (15.5 knots), that two of the same size now on the building program will have speeds of 18 knots. Eleven 32,000 dwt tankers are still to be delivered to the company.

The "British Merchant" was launched from the Newcastle-upon-Tyne yard of Swan Hunter and Wigham Richardson on July 24 and is the largest British-owned tanker launched this year as well as the largest to be built on the Tyne. The launching ceremony was performed by Mrs. R. A. Butler, wife of the Chancellor of the Exchequer. The vessel's overall length is 665 feet and her extreme breadth 85 feet 6 inches with a loaded speed of 15 knots.

The same company also announces the launching of the oil tanker "Wilhelm Jebsen" on July 10. This vessel was built for A/R Caloric (Paul Jebsen), Bergen. She is 530 feet long, moulded breadth 73 feet, moulded depth 38 feet 10 inches, 18,000 dwt, summer draft 31 feet, and service speed 14.25 knots. She is powered by a Swan Hunter-Doxford opposed piston oil engine developing 7,500 bhp at 115 rpm.

Joseph L. Thompson & Sons, Ltd. announce that the oil tanker "Sheaf Royal," built to the order of the Sheaf Steam Shipping Co. Ltd., was launched on July 11. The vessel is of 18,275 dwt, Doxford motor driven, and has a service speed of 15 knots.

Messrs. R. & W. Hawthorn, Leslie & Co. Ltd., Hebburn-on-Tyne, announce that the single screw motor tanker "British Flag" successfully passed her trials on July 22 and 23 and has been handed over to her owners, British Tanker Co. Ltd.

Furness Shipbuilding Co. Ltd. reports that the single screw motor tank vessel "Merchant Baron," of 18,000 dwt, built for the Drake Shipping Co. Ltd. of London, has successfully passed her trials and been handed over to her owners.

Harland & Wolff Ltd. has completed the "N.V. Irex," a 1,200 ton tanker built for Skibsaktieselskapet Fjeld, Norway, and handed her over to her owners after successful trials. The propelling machinery is a Harland-B. & W. single acting four stroke type of diesel engine having six cylinders developing power at 115 rpm.

Mrs. R. A. Butler, wife of the Chancellor of the Exchequer, launches the 32,000 dwt tanker "British Merchant," second of 13 similar tankers ordered for the British Tanker Co., shipping subsidiary of Anglo-Iranian Oil Co.

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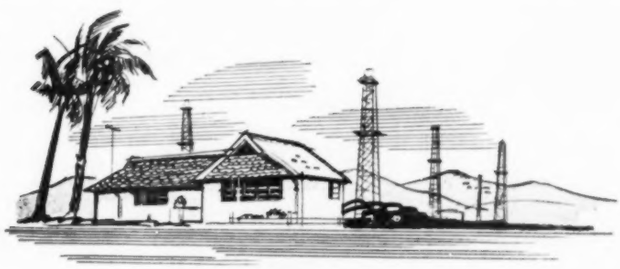

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. . . . IN THE OUTPOSTS OF INDUSTRY

Men and women serving in remote sites or trying climates deserve every home comfort you can give them. Above all, they deserve the heartening comfort of Dunlopillo with its deep, buoyant ease which years of hard use cannot diminish. Hard climates, indeed, demand Dunlopillo, which is unaffected by climatic variations. Air circulates through its cellular structure at every movement to keep the material 'air-conditioned' in extremes of heat and cold.

Dunlopillo is completely hygienic in all conditions. It cannot create dust or fluff. It can never sag, form lumps or otherwise lose its perfect shape. Dunlopillo is a great work-saver, too, for it never needs turning, or airing. From all aspects of comfort, hygiene, economy and convenience Dunlopillo is by far the wisest choice. Dunlopillo comfort is available in mattresses, cushioning, pillows, bolsters, carpet underlay and stair pads.

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DUNLOP RUBBER CO. LTD. (Dunlopillo Division), WALTON, LIVERPOOL 9, ENGLAND
Associated Companies and Distributors throughout the World

the ARC *Portable* COMMUNICATOR

TYPE 12
VHF 118-148 mc

Here's the answer to a need of both military and civilian aviation and other industries as well—a two-way VHF radio communication set that is easily *portable*, requiring only the addition of a 24 volt dc power source. Both transmitter and receiver combined, packed in a handy carrying case, weigh only 37 lbs. With sectionalized antenna, it can be set up quickly anywhere.

Principal uses are for ground or shipboard communication with aircraft. It is useful also to oil and mining prospectors for either ground-to-plane or ground-to-ground communication over rough terrain.

The assembly consists of the R-19 VHF Receiver and a choice of the T-11B or T-13A VHF Transmitters—all widely used by Army, Navy and Air Force. Distance range is 50 to 100 miles, with aircraft at 3000 to 10,000 feet and ground antenna at 30 feet.

Size of case is 18¼ by 8¼ by 18$^{5}/_{16}$ inches. Loudspeaker and/or headset. Write for complete details.

ARC
Dependable Airborne Electronic Equipment Since 1928
Aircraft Radio Corporation
BOONTON NEW JERSEY

The towers of the SO_2 extraction plant which will treat kerosine in position at the site of Anglo-Iranian's new Aden refinery, now under construction.

Work Advances at Aden

Anglo-Iranian's great refinery at Aden is beginning to take shape. Foundations for the two crude distillation units have been laid and units of the SO_2 plant for the manufacture of premium grade kerosine are in position on site. Work is advancing rapidly in the port area, where over a million cubic yards have been dredged, and construction of the 4,000-foot breakwater is about three quarters completed. More than 65,000 tons of materials for the refinery have been shipped to the site.

Personnel

R. J. Pinder *C. C. Bates*

Esso Petroleum Co. Ltd. announces that R. J. Pinder has been appointed a director as from July 1. Mr. Pinder joined the Birmingham office staff in 1920 and advanced through important positions in the company's service until 1937, when he was appointed executive assistant to the International Association (Petroleum Industry) Ltd., where he was concerned with marketing problems of the Esso organization in European countries. In 1945 he returned to the Esso Petroleum Co. to assist in the re-organization of the sales department following the ending of the Petroleum Board. In July 1951, he was appointed general sales manager, and as such was responsible for the recent successful introduction of Esso branded gasolines. His new responsibilities as director will be mainly concerned with sales.

Vickers Armstrongs Ltd. announces that A. O. Bluth, a director of Erlangers Ltd. and vice-chairman and joint managing director of the Jack Olding organization, has been appointed to the board of the company.

Costain-John Brown Ltd. report that C. C. Bates has been appointed chief welding engineer of the company, and in addition will be responsible for the technical work of Welding Supervision Ltd., an associate company. Mr. Bates, who is 39, joined Costain-John Brown Ltd. from the British Welding Research Association, where for the past four years he was one of the senior development engineers responsible for helping industry to apply the results of research, and aiding firms with design, technique, metallurgical and inspection welding problems. In all, Mr. Bates has been associated with welding and welding developments for the past 16 years, so that he brings a wide experience to his new post.

Kwinana Foundations Laid

At Kwinana in Western Australia, foundations have been laid for the new refinery of Anglo-Iranian. Two million cubic yards of sand from banks at the entrance to Cockburn Sound have been removed as part of the work of dredging a new channel for the passage of tankers. Steel piles are being driven for the thousand-foot jetty which will be joined at the seaward end to a 1,700-foot loading jetty with berths for three ocean-going tankers. Orders for more than $20 million worth of equipment have been placed with manufacturers in Britain, the United States and Australia. Building of a town to house workers on the project is well advanced.

Punta Cardon Switch-Gear Equipment Installed

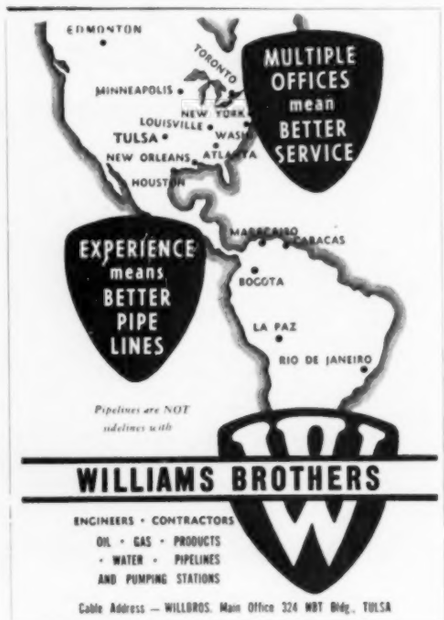
An interesting instance of rapid replacement of equipment has been afforded in the case of the Shell refinery at Punta Cardon, Venezuela. Enlargement of the plant made necessary the installation of larger switch-gear equipment, which was emphasized by a serious fire last September which destroyed the existing installation.

After a thorough canvass to find the earliest obtainable replacement, a contract was placed with Reyrolle, who undertook to supply two-thirds of the metal clad switch-gear in six months, the control and relay in seven months and the remainder of the switch-gear comprising the third section of the panels in eight months.

The contract, valued at about $325,000, was placed on November 15, 1952 and 90 percent of the complete metal clad gear was despatched for shipment at the end of June. The order comprised a 103-foot, 28-panel metal clad switchboard (6.6-kv, 60 cycle duplicate busbar) comprising Reyrolle type "B5T" gear with a rupturing capacity of 500 nva at 6.6 kv. Associated with it is a 32-panel control board equipped with all the necessary control protective, recording and indicating instruments.

Meanwhile, construction is under way at Cardon on a new switch house which is to have fireproof doors supplied by Mather & Platt and carbon dioxide fire extinguishing equipment from Pyrene Co. Ltd.

SALES MANAGER wanted for drilling equipment. Appointment in Great Britain for British firm. Applicants should have field experience. Knowledge of diesel engines desirable. Apply stating age, experience and salary required to Personnel Manager, Box 100, WORLD PETROLEUM, St. Paul's Corner, Ludgate Hill, London E. C. 4, England.



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Seen Around Rigs all over the World

SOLID FORGED WELDLESS STEEL
HIGH PRESSURE FLANGES

BURTON DELINGPOLE & CO. LTD. OLD HILL, STAFFS., ENGLAND
TELEPHONE : CRADLEY HEATH 6237-8 TELEGRAMS : STAMPINGS, CRADLEY HEATH

Shell Adds New Administrative Posts

Two new administrative posts have been added to Shell Oil Company's marketing department. The positions, assistant general sales managerships, are being set up at the company's head office in New York to aid regional sales managers with increasing responsibilities.

O. F. Minor, New York division sales manager, has been appointed assistant general sales manager for the midwest. He will work with Selwyn Eddy, who is general sales manager for the midwest. N. H. Miles, Cleveland division sales manager, has been appointed assistant general sales manager for the East Coast and will work with P. C. Thomas, general sales manager for that region.

Rockwell Promotes Three Plant Managers

Reassignment and promotion of three plant managers has been announced by Rockwell Manufacturing Co. in preparation for the planned opening of the firm's Sulphur Springs, Texas, plant late this year.

Floyd V. Snodgrass, former general manager of the Nordstrom Valve division plant at Oakland, Calif., will supervise production and operations at Oakland and Sulphur Springs.

He is succeeded as general manager at Oakland by W. D. Willes, who has been general manager of the company's Barberton, Ohio plant since September 1952. W. T. Gettig, former works manager of Edward Valves, Inc., has been named general manager at Barberton.

Buys Interest In Plastic Pipe Co.

The Youngstown Sheet and Tube Company has bought an interest in the Perrault Fibercast Corp. of Tulsa, Okla. This concern, which in the future will be known as The Fibercast Corp., manufactures glass fiber-reinforced thermo-setting plastic pipe. This product, which is marketed under the trade name "Fibercast," has wide application where full corrosion resistance is required. It will be distributed through Continental Supply Co., The Youngstown Steel Products Co., and the Youngstown Steel Products Co. of California.

New Battery Disconnect Switch and Cable

A new type of battery disconnect switch and battery cable, developed by the automotive section of The Atlantic Refining Co., has been made standard equipment on all of the more than 500 trucks operated by the company. One of the chief purposes is to provide a means of immediately eliminating current from all vehicle wiring in case of an electrical fire or other emergency.

To Start New Pipe Perforating Concern

J. J. Siegel, for many years with Kobe, Inc., has resigned to launch his own pipe perforating and prepack concern. The new company, Tryad Service Corp., will be headquartered at 3914 Cherry Avenue, Long Beach, Calif. Mr. Siegel who has been with Kobe since its founding and is one of the original stockholders. He will be associated in his new enterprise with Norman Schrank.

F. V. Snodgrass *W. D. Willes* *W. T. Gettig*

Dedication of Pioneer Pipe Line

Formal dedication of the Pioneer Pipe Line was observed at Salt Lake City on August 10. The line was built as a joint undertaking by the Sinclair and Continental companies and is approximately 300 miles in length, extending from Sinclair, Wyoming to Salt Lake City, Utah. It will be used to convey 12,000 b/d of refined products from Wyoming to Utah for local use and for transhipment to the Northwest and the Pacific Coast.

J. W. Liddell, president of Pioneer, presided at the ceremonies and addresses were delivered by P. C. Spencer, chief executive of Sinclair, and L. F. McCollum, president of Continental. Mr. Spencer emphasized the potential importance of pipe lines to the national security and gave point to their value by showing how a shipment of gasoline from his company's refinery at Marcus Hook, Pa. can travel all the way to the Rockies in an unbroken journey and by building a short connecting line in Wyoming could be carried to the extreme Northwest and the Pacific Coast.

The mobility imparted to the movement of essential defense products by the growing network of transportation lines is of highest significance in meeting security needs and possible emergencies.

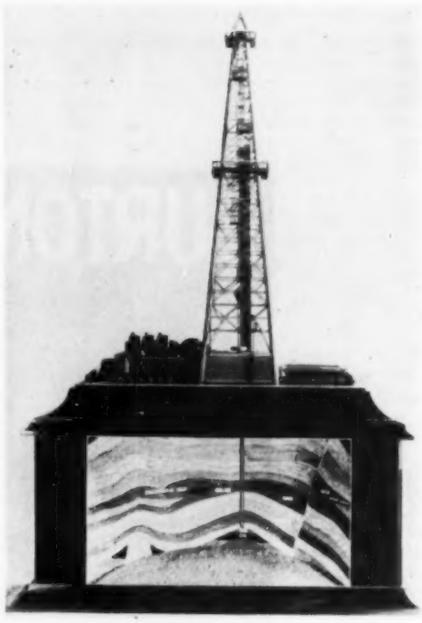
Tucker Heads Unit Rig Sales

J. T. Tucker, until recently general manager of sales of Emsco Manufacturing Co., has joined Unit Rig and Equipment Co., Tulsa, as general manager of sales. Mr. Tucker joined Emsco in 1940, first as a field service man and later as sales manager of mid-continent operations with headquarters in Houston.

Working with Mr. Tucker will be Ray Loudenback, who has been with Unit Rig since 1937, first handling service activities of the company, and who at the present time will serve as southern division sales manager with headquarters in Dallas. He will represent the company in Texas and other Gulf Coast states. Earl Kirberger, formerly with Franks Manufacturing Co., and in Unit Rig's sales and service department since 1940, will be northern division sales manager working out of the Tulsa office.

Standard Rectifiers

American Rectifier Corp., New York, now is building standard unit rectifiers for shipment from stock. Units now in stock range from 3 to 50, 125 or 230 volts output and either fixed or variable voltage, units to accommodate any voltage or frequency input.



Scale Model Base

A colorful base containing a dramatic cross-section of earth strata, oil traps and other underground formations is being produced by the American Petroleum Institute to supplement the scale-model drilling rig made available to the industry last year.

The rig and the base can be used to good advantage in schools, colleges and training programs or as an eye-catching display for windows and lobbies, exhibits, fairs, shows and other public events.

Educational Exhibit

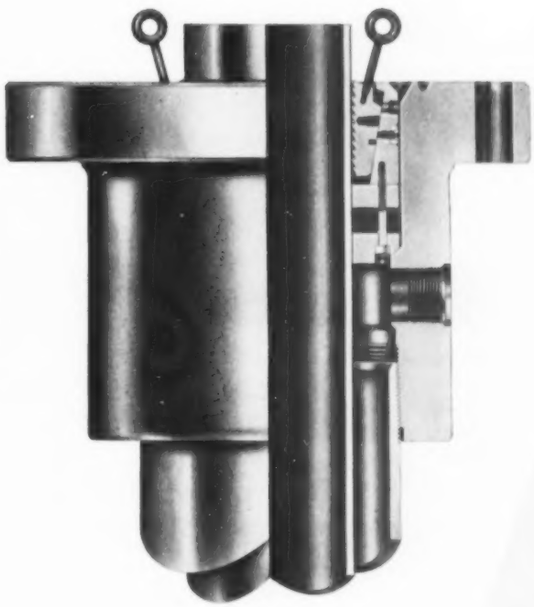
An exhibit showing how Socony-Vacuum has contributed to man's progress and well-being has been installed in the visitors' gallery of the New York Stock Exchange where it will be seen by the more than one thousand persons from all over the country who visit the exchange daily.

Central figure of the Socony-Vacuum exhibit is an animated map of the United States, showing pipe lines, marine transportation routes and refinery locations. A visitor can find out how many Socony-Vacuum stockholders live in any State by pushing a button with the name of the State. The correct answer flashes up on the map. On one side of this center panel are attractive illustrations symbolic of the company's worldwide operations. On the other side are color transparencies depicting how the company has contributed to better living and to progress in flying, industry, sports, transportation and science.

John F. Seal, a director and vice-president in charge of finance, Socony-Vacuum Oil Company, Inc. (right), and G. Keith Funston, New York Stock Exchange president, inspect the oil company's exhibit in the Visitors' Gallery of the Exchange.

introducing the new champ in the medium duty field

Ever since O-C-T pioneered the first deep well casing head that provided casing seal and suspension before blowout preventers were removed, we have recognized the need for this same safe, simplified type installation for a medium priced — medium duty casing head. Now, O-C-T research and study of casing head flexibility and safety have resulted in the introduction of this new O-C-T "C-20" Casing Head for medium depth wells. Check the features, advantages, and safety this new O-C-T head brings to the field . . . then write for the C-20 Brochure containing Engineering Nomograph for Calibrating Casing Loads and Pressures . . . Or ask your O-C-T Representative for details. Available through more than 700 supply store locations.



O-C-T C-20 CASING HEADS

THE FIRST AND ONLY QUICK-SETTING, POSITIVE-SEALING WELL HEADS DESIGNED ESPECIALLY TO ELIMINATE OPEN HOLE HAZARDS IN MEDIUM DEPTH WELLS.

1. Seals and suspends casing before blowout preventers are removed.
2. Saves hours of costly rig time — simplifies installation.
3. Sealing element, slip bowl and slips are assembled at the O-C-T plant as a single unit that may be wrapped quickly around the casing, latched and dropped into place from the derrick floor.
4. It employs a resilient seal ring which provides an effective seal for the life of the well in any climate.

Oil Center Tool Co. P. O. Box 3091 Houston, Texas

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BARRELS PER DAY _____
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C. G. Cortelyou *V. M. Stanich*

Appointments for General Petroleum's Ferndale Refinery

Two executive appointments for the new Ferndale, Washington refinery have been announced by Gale L. Adams, General Petroleum Corporation's vice president and director of manufacturing.

Curtis G. Cortelyou has been named manager of the plant, which is now under construction, and V. M. Stanich has been appointed chief engineer.

In his new post, Mr. Cortelyou succeeds R. E. Lauterbach, recently promoted to manager of General Petroleum's manufacturing department.

Mr. Cortelyou has been with General Petroleum since 1938. After working as a laboratory technician, he became measurement engineer in 1940. In 1943 he was assigned to the engineering department and has been job engineer, project engineer and chief design engineer.

Mr. Stanich joined General Petroleum in 1937 in laboratory work. He has served as a lubrication engineer, a chemical engineer and a refinery engineer. He served as a Lt. Commander in the U. S. Navy during World War II in the South Pacific.

Increase Line Capacity

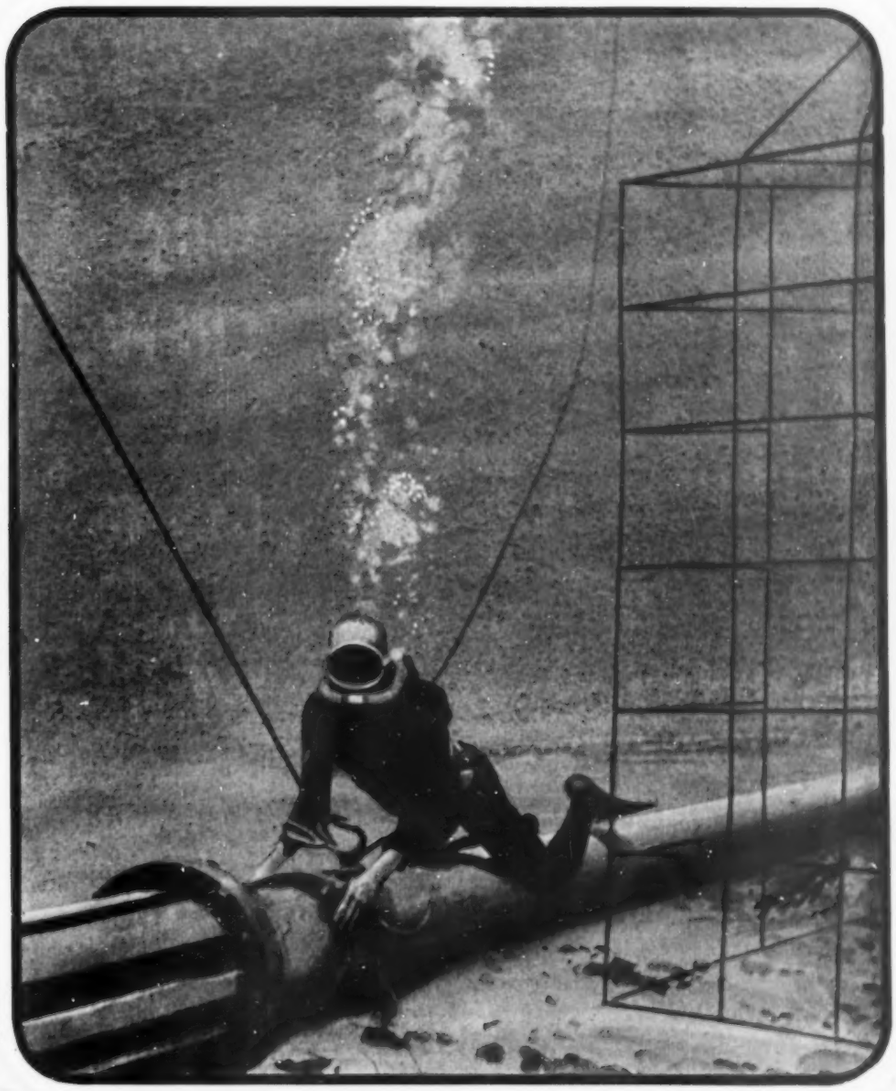
An expansion program providing for a 20 per cent increase in the capacity of the 566-mile petroleum products line from Salt Lake City to Pasco has been announced by J. T. Higgins, president of the Salt Lake Pipe Line Company. Cost of the project is estimated at $1,700,000.

The installation will provide a capacity of 42,500 b/d from Salt Lake City to Boise, and 22,500 b/d from Boise to Pasco.

Cooper-Bessemer Adds to Seattle Staff

Appointment of Todd W. Smith to the Seattle, Washington office has been announced by Stanley E. Johnson, vice president of The Cooper-Bessemer Corp., Mount Vernon, Ohio. The assignment as sales and engineering representative will be under the direction of C. R. Jones, branch manager of Cooper-Bessemer's office and warehouse facilities in Seattle.

T. W. Smith



THE STEEL TUBE AGE

A submerged oil pipeline of 16 in. S & L steel tubes for Shell's installation at St. Vincent, Cape Verde Islands. Connections from the steel pipeline to a 10 in. submarine hose were made by frogmen who, whenever a shark was sighted, swam into the steel net cage. The submarine pipeline has already speeded up the turn-round of tankers from five days to 41½ hours.

STEWARTS AND LLOYDS LIMITED

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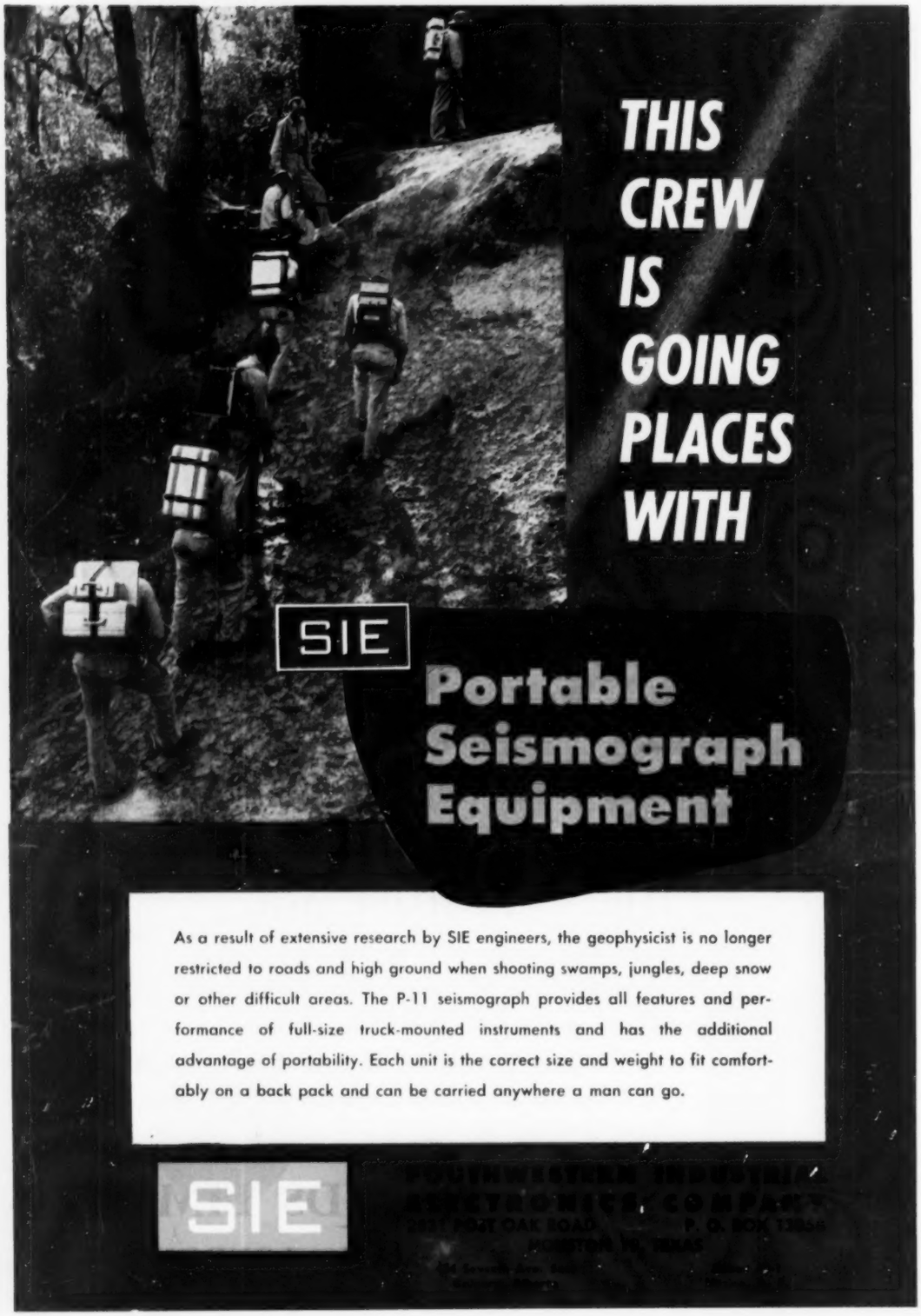
THIS CREW IS GOING PLACES WITH
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Portable Seismograph Equipment
As a result of extensive research by SIE engineers, the geophysicist is no longer restricted to roads and high ground when shooting swamps, jungles, deep snow or other difficult areas. The P-11 seismograph provides all features and performance of full-size truck-mounted instruments and has the additional advantage of portability. Each unit is the correct size and weight to fit comfortably on a back pack and can be carried anywhere a man can go.
SIE

New Attapulgus Gelling Agent

Attapulgus Minerals & Chemicals Corp. has announced the assignment of C. O. Martin to sales and technical service activities in connection with Permagel, the company's new thickening agent for organic and aqueous media.

Warren Building Gasoline Plant

Warren Petroleum Corporation has announced that construction has begun on its Saunders natural gasoline plant, near Lovington, New Mexico, with completion scheduled for February 1954.

The plant will process gas from pools in the northwest part of Lea County, and any future oil pools which may be developed in that area. The Fluor Corporation Ltd. has the contract to construct the plant.

The initial installation will include facilities to gather and process approximately 22 million cubic feet of gas daily, with a daily production of 30,000 gallons of natural gasoline, 15,000 gallons of butanes, and 31,000 gallons of propane. Approximately 16 million cubic feet of residue gas will be delivered to a gas transmission pipe line network. Compressor facilities will consist of five 1350 angle-type gas engine units and plant design provides for potential doubling of capacity by installing additional compressors and making a few minor equipment changes.

Walter Wells Honored

In recognition of outstanding achievement in engineering, Walter T. Wells, chairman of Lane-Wells Co., technical oil field services, and chairman of Superweld Corp., technical metallurgical processes, received the Dean Anson Marston Award of Iowa State College at Ames, Iowa on June 12, 1953. This medal is one of the most coveted in the entire engineering profession and is presented to one alumnus each year, at least 30 years after his graduation.

On June 20, 1953, Mr. Wells received an honorary degree of Master of Public service from California State Polytechnic College at San Luis Obispo. This is in recognition of the many services he has done in behalf of Cal Poly and education in general.

In June 1946, Mr. Wells received the Chicago Alumni Association merit award of Iowa State College, given each year to an outstanding alumnus in engineering. On February 21, 1952, West Coast University conferred an honorary degree of Doctor of Science on him for distinguished service in the advancement of engineering education. He is a member of the State College Council representing California Polytechnic College and is also a member of the President's Advisory Council of George Pepperdine College, Los Angeles.

Porter Refutes Claim of High Inventories

In a statement released from his New York office on July 15, Frank M. Porter, president of the American Petroleum Institute, refuted charges made at the Wolverton Committee hearings in Washington that oil inventories are abnormally high. He declared that the basis of comparison "is anything but realistic, and as a result, a distinctly unfair impression is being created in the public's mind." Mr. Porter explained:

"In May 1952, the refining segment of the industry was hit by a severe strike. To keep the American people from being deprived of essential products and services, more than 50 million barrels of refined products were withdrawn from storage during the strike period.

"Inventories were reduced to low, almost dangerously low, levels. Therefore, to compare today's level of refined inventories with those of one year ago and say they are much, much higher is literally true in one sense, but in actuality is only a half-truth. It completely ignores factors which should not and cannot be disregarded."

The API president said a much fairer comparison of current inventories would be between a pre-strike 1952 date, and a corresponding date for 1953. When this is done, he said, the following comparisons are revealed:

Crude oil available in storage in 1952 was 13.0 days supply; in 1953 it was sufficient for 14.4 days; clean products, (gasoline, kerosine and distillates including home heating fuel oils) 1952—28.1 days, 1953—27.7 days; residual fuel oil 1952—12.9 days, 1953—13.9 days.

This comparison, Mr. Porter commented, makes it "immediately obvious that the increase in inventories is very moderate, and by no stretch of the imagination could be called excessive.

"It is a fact that the industry, because of this refining strike, was in a bad way a year ago, particularly with respect to gasoline inventories and home heating fuel oils. It was only through the availability of large refining and crude oil producing capacity that the situation was met at all.

"As everyone knows, water will emerge from a pipe line or a garden hose only after the line or hose is filled from one end to the other. Similarly, the refining, pipe line, transportation and other facilities of the petroleum industry must be kept filled and moving if gasoline, home heating oil and other products are to be available when and where they are needed."

Citing a series of National Petroleum Council reports which found that 65 percent of the industry's crude oil inventories, 40 percent of its light products, and 42 percent of its residual fuel oil are unavailable for sale continuously, Mr. Porter said: "They represent an extremely high percentage of the total amount of so-called inventories as reported by the Bureau of Mines; they are considered 'unavailable' to meet demand, because they must be kept 'on the shelf' permanently."

"In the light of these facts," the API President concluded, "it is readily apparent that the currently higher inventories represent primarily a restoration to required levels from those that resulted from the refinery strike in 1952. It is seriously doubted that any other major industry, or its customers, operates on such low relative stocks as does the petroleum industry. This is a good indication of the efficiency and flexibility of the industry's distribution and other operating divisions, not the least benefit of which is the resultant saving on the cost of products to the general public."

The relationships of the figures referred to are shown in the following table:

UNITED STATES TOTALS

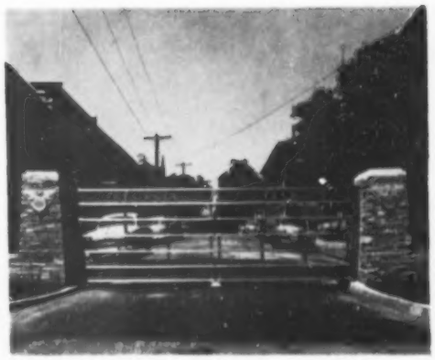
(All figures in barrels of 42 U.S. gallons except percentages as indicated)

	(a) Actual Inventories	(b) Unavailable Portion of Column 1		(c) Available to Meet Demand Total	Day's Supply
Crude Oil					
March 31, 1952	259,126,000	170,667,000	65.9%	88,459,000	13.0
April 30, 1953	280,487,000	184,841,000	65.9%	95,646,000	14.4
Clean Products					
March 31, 1952	226,256,000	86,991,000	39.5%	139,265,000	28.1
April 30, 1953	239,716,000	94,688,000	39.5%	145,028,000	27.7
Residual Fuel					
March 31, 1952	37,971,000	15,837,000	41.8%	22,134,000	12.9
April 30, 1953	39,572,000	16,541,000	41.8%	23,031,000	13.9

(a) Inventories as reported by the Bureau of Mines, Department of the Interior.

(b) From report by National Petroleum Council for 1952; calculated on same basis for 1953.

(c) By calculations; day's supply based upon demand rate which prevailed during month reported on.



Georgia Tech Gate Honors Harris

Graduates of Georgia Institute of Technology are "carving indelible entries in the archives of modern civilization," David W. Harris, president of Universal Oil Products Company, said at Atlanta at the recent dedication of The Harris Gate on Tech's campus. The gate was built in honor of Mr. Harris, a Tech alumnus.

It will be opened only on special occasions or for emergencies. Dedication was by Col. Blake R. Van Leer, Georgia Tech president. Among those attending the ceremony were state and local government officials, faculty members, civic, business and industrial leaders.

New Reformer Planned

Pan American Refining Corp. has awarded a contract to the M. W. Kellogg Co. to build a catalytic reforming unit at the company's Texas City refinery. This unit is the final step in the present expansion program at the Texas City refinery which includes an expansion of the alkylation unit, a new combination catalytic cracking and polymerization unit, some revisions to present thermal equipment, and substantial increase in office, engineering, research and development buildings. The new catalytic reforming unit will have a capacity of 21,000 barrels per stream day. It is expected that the new catalytic reforming unit will be completed and in operation in the Fall of 1954.

Appointed To API Marketing Division

Adam J. Rumoshosky has been appointed associate director of the division of marketing of the American Petroleum Institute, effective August 1.

A marketing division office will be re-opened in the New York API headquarters on the same date.

The Washington marketing office, which has been the division's headquarters for some time, will be continued until March 1, 1954, when the current division director, Dr. John W. Frey, will retire. After that, the marketing headquarters will be located in New York.

A. J. Rumoshosky

South end of Green River Basin at the foothills of the Uinta Mountain uplift. In the middle distance, the Green River flows into Flaming Gorge to start its canyon route through the Uinta Mountains.

The Green River Basin

(Continued from page 69)

which is probably in Mesaverde at 9,419 feet, total depth, the deepest well to be drilled in this field.

Development of Wasatch production through these two fields has been fairly constant, with no spectacular wildcat drilling following the discoveries of the area. The fields were along well developed Tertiary surface features, with no similar sizeable structures evident from surface exploration. There was not too much attempt in the 1930's and early 1940's to do geophysical work through the area in searching for similar features not sufficiently developed on the surface.

There was, however, study by a number of operators for structures with possible Cretaceous or lower reservoirs that could be reached at economic depths. As a result of this, gas was found in the Dakota at Salt Wells, midway between the Hiawatha field and the South Baxter Basin field, Sweetwater County, Wyoming. Following the discovery, which flowed an initial of 12,625,000 cubic feet of gas daily from a zone at 6,260 feet, Continental Oil Company and Husky Oil Company, the operators, did little development drilling until market outlet was completed last year.

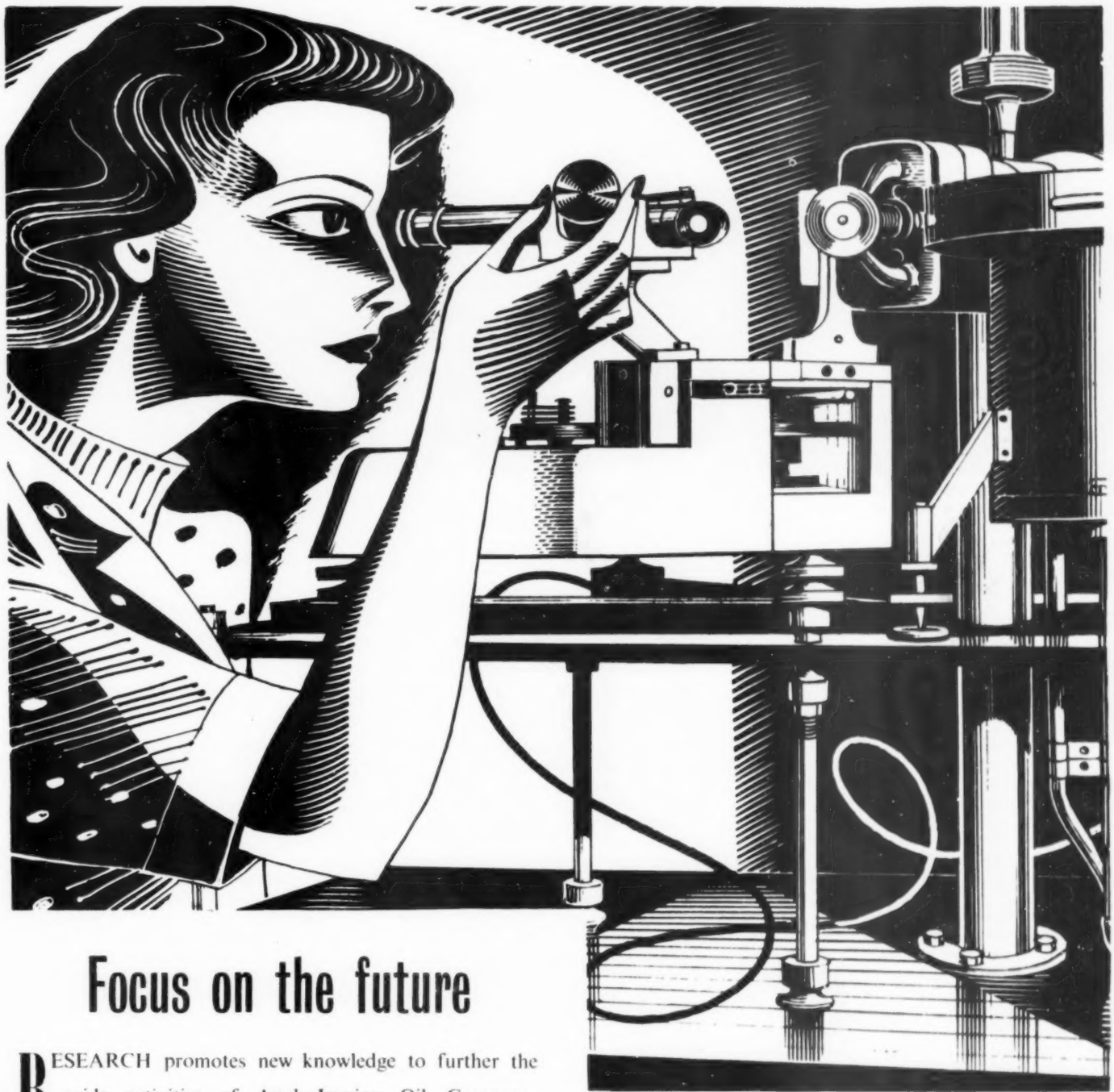
The overthrust belt, along the west side of the basin, continued to be an area of considerable interest to a number of operators in the region. Following the discovery at LaBarge in 1924, there were attempts at similar shallow basal Wasatch production without success. However, as early as 1947, deep tests were drilled through the overthrust area in testing large fault blocks. The California Company's #1 Tierney, C NE NE 15-29N-115W, on Snider Basin, Sublette County, went to 9,544 feet total depth for a test of Twin Creek (Nugget-Jurassic) which carried water. Several other wells, including a series along the southwestern part of the overthrust belt through southern Lincoln and Uinta Counties, failed to establish production through the duplicated series of Tertiary and Cretaceous zones.

The first production along the overthrust belt was found by General Petroleum Corporation in 1951 when a Nugget sand (Jurassic) producer was completed at #4X-12-G, SW SW NW 12-28N-114W, Sublette County. This well drilled the upper overthrust sections to a total depth of 10,692 feet and was completed flowing 266 barrels of 60 gravity oil per day. Drillstem tests when the formation was drilled had indicated a much better producer. However, the company's second and third wells were failures in Nugget. The fourth well, #71-11-G, NW NE NE 11-28N-114W, pumped 450 barrels of oil daily from the Nugget for completion. Although this drilling program has failed to indicate substantial reserves, apparently the wildcat program along the overthrust belt will continue during the coming years.

The Church Buttes field, along the Sweetwater-Uinta County line, was the first indication in Wyoming that Tertiary conformed with Cretaceous beds and seismic work through the area confirmed sizeable structure. Mountain Fuel Supply Company, joined by the State of Wyoming and Union Pacific Railroad Company in a 49,838 acre unit, made this discovery in 1946 with production from the Morrison (Lower Cretaceous) sands at around 12,000 feet. The company has continued an expensive drilling program in development of the gas and has drilled one Nugget sand failure in the field. There are now 15 completed wells in the field, with two of these dry holes, and another in completion stages after finding gas in a new producing sand of First Dakota.

Probably as much interest was created in the Green River Basin by the deep drilling at Pacific Creek as was caused by the discovery of gas at Church Buttes. The Pacific Creek failure, #1 Unit, SW NE SW 27-27N-103W, was also drilled on a surface and seismic high. Superior Oil Company first drilled the well to 9,881 feet in Mesaverde, where some gas shows were reported, then later moved in a heavy rig and deepened the well to the world's present depth record of 20,521 feet, in the Frontier (lower Cretaceous) sands. A number of shows of both oil and gas were found through the upper Cretaceous, but these failed to be commercial after the operator ran casing to total depth and did successive performance and testing.

The two Mesaverde discoveries in southern Sweetwater County that created the impetus for the current play are located between the Hiawatha-Salt Wells fields, along the south rim of the Rock Springs uplift. Both discoveries were made in the latter half of 1952. Stanolind Oil & Gas Company has long been active in exploration through this portion of the Green River Basin, and had spent considerable money in attempting to obtain commercial production from the Canyon Creek failure northwest of Hiawatha. This company's #1 Unit, SW NE NE 10-12N-103W, between Hiawatha and Canyon Creek in the Middle Mountain area, Sweetwater County, Wyoming, was completed for an initial flowing production of 170 barrels of oil and 1,156,000 cubic feet of gas daily. The well established the first



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Church Buttes Unit Well No. 6 in Bridger badlands, an area typical of the interior part of the Green River Basin, Uinta County, Wyo.

commercial production from Mesaverde in the Green River Basin. Mesaverde was topped at 5,810 feet in the well, and on drillstem test (6,536-52 feet) the well made 702 feet of 53 gravity light green oil with gas at the surface in 15 minutes. Another test (6,532-54 feet) showed 1,000 feet of free oil with 400 feet of water in two and one-half hours. The well established a producing section, free of water, of only 15 feet. However, the second well in the field, #2 Unit, C SW NW 11-12N-103W, now nearing completion, found an estimated 35 feet of effective pay on drillstem tests in the correlating zone of Mesaverde. Elevation on this discovery well is 9,308 feet, making it the world's highest producing well.

A second discovery in the area, Mountain Fuel Supply Company's #1 Trail Unit, NE NE SE 9-13N-100W, Sweetwater County, Wyoming, flowed 4,260,000 cubic feet of gas from a sand in Mesaverde between 7,530-68 feet. Mesaverde was topped in this wildcat at 4,818 feet. The well had a number of gas shows through sands of the Mesaverde, with the completion zone the best gauge obtained. Mountain Fuel has done no further exploration in the area, but is expected to establish a development program following the exploration program now under way through the general Hiawatha-Powder Wash area.

Another discovery in Mesaverde has been made in 1953 in the Sugar Loaf area, Moffat County, Colorado, immediately southwest of Hiawatha. Well #1 Unit, SE SW NE 9-11N-101W, flowed at the rate of 4,670,000 cubic feet of gas daily on drillstem test (5,146-86 feet) and the operator is continuing to drill and test zones of the Mesaverde. The well is scheduled to be drilled through that formation.

Of considerable interest in connection with discoveries in both the Lance and Mesaverde zones through this area of the Green River Basin is the theory that sands of these formations are probably not so lenticular in nature as those found in the Wasatch formation above. Mesaverde is a thick section throughout almost the entire basin area, similar to the Mesaverde zone of the San Juan. Additional drilling and considerable geologic study will be necessary prior to classification and proper reservoir analysis of the formations. However, very little reserve was established for the Mesaverde in the San Juan Basin prior to shooting and proper completion and production practice study through that area.

Although little data has been furnished on an interesting drilling program in central Sublette County, south and east of the Big Piney gas area, Arthur Belfer has reportedly completed a gas discovery in Mesaverde in that area. Volumes, tests and tops have not been released on any of the wells, with #1-C Government, C NW NE 28-28N-113W, Dry Creek, reportedly the Mesaverde discovery well. Belfer has several wells drilling at Big Piney, Dry Creek and South Big Piney in development of gas reserves, now estimated in excess of several billion cubic feet.

Continental Oil Company has joined the drilling program through this area with a Mesaverde test at #1 Government-Northern Pump, C NE NE 32-30N-113W, Big Piney area, Sublette County, now in the drilling and testing stages. The well has had a number of shallow gas shows, none of sizeable volume, to below 3,000 feet. Mountain Fuel Supply has large lease holdings through this area and is presently drilling a wildcat at Deadline Ridge, SW SE NW 22-28N-115W, with this well scheduled to test Nugget sand at around 10,000 feet.

In addition to the discoveries presently made in Mesaverde through this basin and the increased interest during recent years in gas reserves, the action that has focused attention on gas reserves in this basin was the filing for permit by Pacific Northwest Pipe Line Company for a pipe line from the San Juan Basin to Seattle and Portland. This line, as proposed, would traverse the Green River Basin, augmenting supplies from the San Juan with any available gas along the route. This application is still in hearing before the Federal Power Commission. The line would furnish an outlet for such fields as Piceance Creek, south of the Green River Basin in the northern Uinta Basin, where basal Green River production was established as early as 1930, no outlet being available since that time. With the prospect of very sizeable gas production from Tertiary and upper Cretaceous zones through both the Green River and Uinta Basins, this proposed gas outlet, or a similar project, will be needed to furnish the gas market necessary for a thorough program of exploration and development drilling.

With four new Mesaverde discoveries, two new Lance discoveries and important development drilling for Wasatch zones now under way in the Green River Basin, in addition to the very active wildcat program, it appears that this long-dormant basin of the Rocky Mountains will finally take a position as one of the more important from both an oil and a gas standpoint.

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INTERNATIONAL NEWS AND NOTES

Creole Elects Four New Directors

Creole Petroleum Corp. has announced the election of Messrs. Lawrence Cade, Siro Vasquez, Martin E. Jones and Leo E. Lowry, all resident in Venezuela, as directors. This increases the number of members of the Board from ten to fourteen. All of the new directors have had long service with Creole and other affiliated interests of the Standard Oil Co.

Mr. Cade went to Venezuela as a driller in 1932 and worked in various districts and divisions of the company, having been manager in both the eastern and western divisions. For the past year he has been in Caracas as a member of the management committee.

Dr. Siro Vasquez joined the Standard Oil Co. of Venezuela in 1937 as a petroleum engineer in the Quiriquire field in eastern Venezuela. He was transferred to Caracas as chief petroleum engineer and later became manager of the production department. Dr. Vasquez is a graduate of the Universidad Central of Caracas and of the University of Tulsa.

Mr. Lowry was first employed by the Carter Oil Co. as a junior clerk and went to Venezuela a year later. He was recently appointed comptroller, which position he is now resigning.

Mr. Jones also began his career with Carter as a student trainee. In 1938 he was transferred as a lawyer to the Caracas office of the Standard Oil Co. of Venezuela. Later he served in Brazil and New York. He returned to Venezuela in June 1950 to become a member of Creole's management committee.

Announcement was also made of the election of John E. Andrews as comptroller to succeed Mr. Lowry. Mr. Andrews started his career with the company in 1937 when he was employed as a junior roustabout and material yardman with the Humble Oil and Refining Co. in Texas. In 1939 he was transferred to Venezuela as a field accountant. He has been manager of the accounting department in Caracas since November 1952.

California Standard To Build At Vancouver

T. S. Petersen, president of Standard Oil Company of California, has made known that the company will shortly begin construction of a new refinery at Vancouver, British Columbia. The plant will be built by Standard Oil Company of British Columbia, a wholly owned subsidiary of the California company. It will operate on Alberta crude which will become available on completion of the Trans Mountain Pipe Line.

The refinery is designed for a daily throughput of 11,000 barrels and is estimated to cost around $10,000,000. According to the announcement, it will not supplant the company's existing Vancouver plant which will continue in operation. Erection of the new refinery is scheduled for 1954.

Equipment of the new refinery will include a two-stage distillation unit, a catalytic cracker and a polymerization unit. It is intended primarily to supply the rapidly growing demand for petroleum products in the Pacific Coast area of Canada.

To Train Foreign Distributors

Thirty representatives of Standard Oil of California's Latin American distributors will be in San Francisco August 31 to September 25 to undergo sales training under auspices of the company's foreign trade and marketing departments. The group, representing 13 South and Central American countries, will be the first to be invited here for specialized training under an informal "Point Four" program being conducted by the company.

New Catalyst Firm

Universal Oil Products Co. has formed a new foreign catalyst manufacturing subsidiary in conjunction with Johnson, Matthey & Co. Ltd., well known London platinum refiners. The new firm is Universal Matthey Products Ltd., with headquarters at 78 Hatton Gardens, London. Universal Matthey will manufacture UOP Platforming catalyst for the sterling market. Procon (Great Britain) Ltd. will build the new catalyst plant, which is expected to go into production in mid-1954. C. D. Sims of UOP has been named general manager of Universal Matthey. George Orescan, Universal's assistant treasurer, is assistant secretary of the new firm. Johnson, Matthey & Co. officials who are officers of Universal Matthey are L. C. Montague, a managing director, named chairman, and P. D. F. Varrall, secretary, who occupies a similar position with the new firm.

Completing Trans Mountain

Construction crews working on the Trans Mountain Oil Pipe Line project have moved into the Fraser River Valley on the last lap of the 718-mile system between Edmonton, Alberta and Vancouver, B. C., which was scheduled for completion the first week in September.

Nearly 1,000,000 barrels of oil are now in storage at the Edmonton tank farm preparatory to filling the line. Pump stations have been tested at Edmonton and Kamloops. Work is progressing rapidly on Westridge deepsea terminal on Burrard Inlet. This unit will be completed by October 15.

Manufacture Diamond Bits in France

Christensen Diamond Products Co. (France) began manufacturing diamond drilling bits at a new plant in Villeneuve-La-Garenne, Seine, France, on June 15. Deliveries of diamond bits and diamond washover shoes have begun. The new plant is under the direction of W. I. Harris, former sales manager of the United States company. He is assisted by a number of American technicians.

Imperial Dedicates Building

Imperial Oil Ltd. recently dedicated a new $275,000 sales office building at Regina, Sask. Imperial this year marks its 65th anniversary of doing business in Regina and the opening of the building has coincided with the city's golden jubilee celebrations. With its refinery and district exploration office in Regina, Imperial employs some 600 persons in the city.

Hydro-Test Goes to Venezuela

The Hydro-Test method of testing tubing under hydraulic pressure as the tubing is made up and run back into the well is being introduced to Venezuelan fields by Superior Pipe Service C. A., a Venezuelan corporation. This is the first Hydro-Test service to be offered in foreign fields.

Geelong Refinery Completed

Shell Company of Australia Ltd. has announced the completion of its refinery at Geelong and of the first section of the pipe line connecting the plant with Melbourne. The refinery has a capacity of 15,000 barrels daily and is expected to go on stream early in 1954.

Seeks Concession in Belgium

A report from Brussels states that Belgian Shell Company has applied for a concession to explore for oil and gas in an area of 107,500 hectares (265,525 acres) in the provinces of Antwerp and Limburg along the Dutch border.

Britain's Share in World Refinery Capacity

British and associated Dutch interests owned crude oil refinery capacity totalling fractionally over 100 million metric tons per annum at the end of 1952—without including the 25 million ton plant at Abadan, according to a compilation by Petroleum Information Bureau, London. World capacity at that time amounted to 683 million tons (ex Abadan), of which American interests owned 460 million metric tons, including 367 million tons located in the United States itself. All other nationalities together owned plant with a total capacity of 123 million tons—almost exactly half of which lay in the USSR and Eastern Europe. Of the British and Dutch plants, some 32 million tons of capacity was in Western Europe, about 26 million tons in Latin America and 24 million tons in the U.S.A. and Canada. The remainder was in the Far East (10,500,000 tons) and the Middle East (7,500,000 tons).

The world's capacity of 683 million metric tons at the end of 1952 compared with an actual production of 640 million tons of petroleum (including natural gasoline) in 1952, and a somewhat higher output at the year's end. The margin achieved, despite the continuing growth of world production in response to increased demand, is an indication of the success of the oil industry in extending its facilities for processing crude oil. The actual surplus was no more than that required for efficient operations, with adequate allowance for servicing plant.

Gas Discoveries in British Columbia

Oil company drilling and exploration in the northeastern section of British Columbia during the summer resulted in a discovery in the rugged Buick Creek area by Socony-Vacuum Oil Co. During drilling and testing on Buick Creek No. 2, a rise of 800 feet of oil was reported in one test while an earlier test got a gas flow of 2.3 million cubic feet per day.

The discovery came after two years of exploration which included geophysical surveys, surface geology and airborne magnetometer surveys taken by helicopter. Buick Creek No. 2 is a mile west of Buick Creek No. 1 which flowed gas at a rate of 4.9 million cubic feet in one test and 3.8 million cubic feet with a spray of 36 gravity oil in another test.

The No. 1 well was drilled to 11,832 feet and plugged back to 3,732 feet where it is being tested for completion as a gas well. Buick Creek No. 2 is 40 miles west of Fort St. John.

Another Fort St. John area well, Pacific Fort St. John No. 23, brought gas to the surface in 2½ minutes at the rate of 10,900,000 cubic feet per day with the valve open one hour 55 minutes. Flowing pressure was 1,700 psi. Recovery showed 40 feet of gas cut mud and two feet of naphtha. The well is 2½ miles southeast of Fort St. John.

Marine Terminal Pipe Lines at Bombay

Award of a contract to Merritt-Chapman & Scott Corp. for construction of an extensive system of subaqueous and overland pipe lines to link two petroleum refineries now being built at Bombay, India with an offshore marine terminal has been announced by the Bombay Port Trust. Major phase of the work will involve the construction of approximately 50 miles of pipe line to provide a network of seven lines between marine terminal piers off Butchers Island, approximately 2½ miles offshore, and two refineries now being built on the outskirts of Bombay, one by Burmah-Shell, the other by the Standard-Vacuum Oil Co. The seven lines will range from eight to 24 inches in diameter.

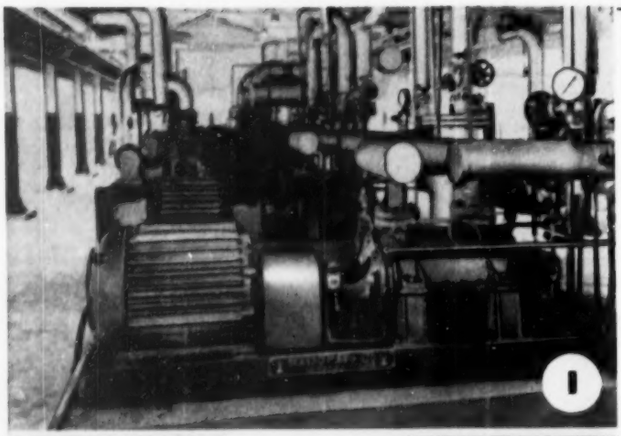
Egloff Honored by Royal Society

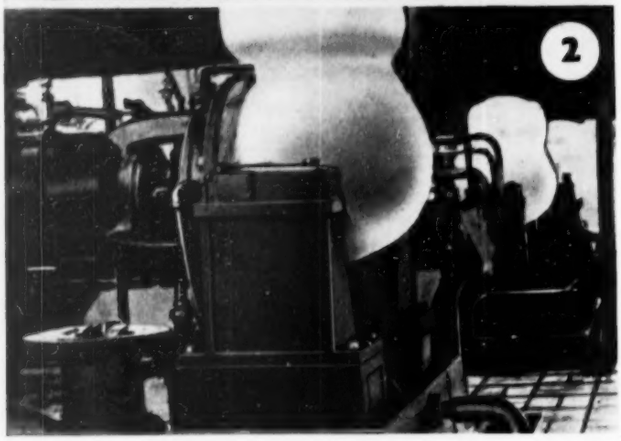
Dr. Gustav Egloff, director of research for Universal Oil Products Co., has been elected an honorary fellow of the Royal Society of Edinburgh, one of four non-British subjects who have been so honored this year.

by FOSTER WHEELER

At the Port Jerome refinery of Esso Standard Society Anonyme Francaise' on the River Seine between Paris and Le Havre, one of the first Model IV Fluid Catalytic Cracking Units in Europe was placed "on stream" this month.

It is the second Model IV unit to be completed by Foster Wheeler. A third unit is currently going on stream in Massachusetts and four more are in various stages of design and construction.





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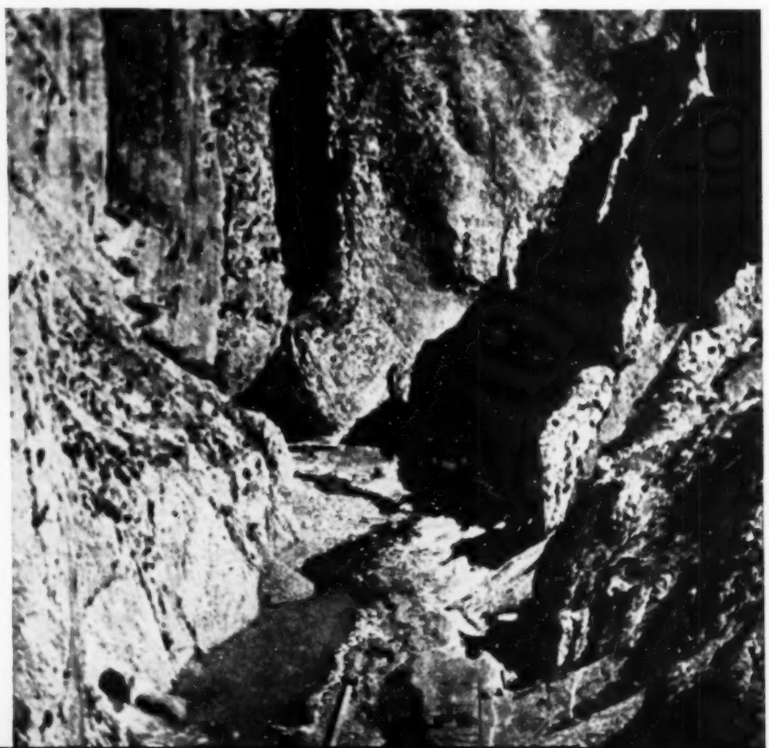

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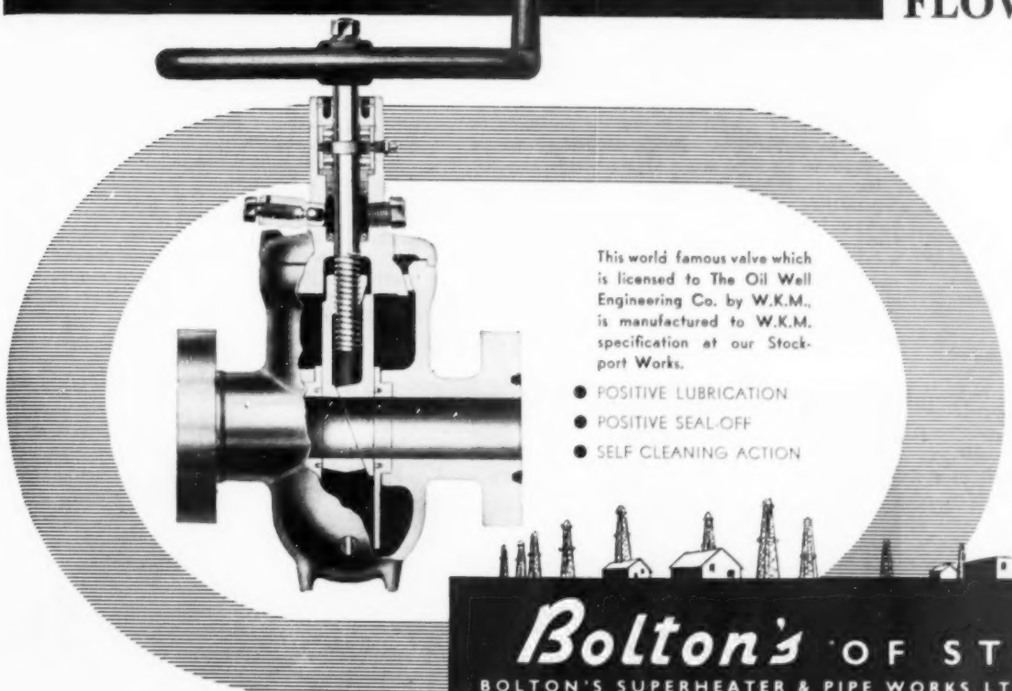

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OIL COMPANY STAFF CHANGES

J. B. HAMILTON has been appointed superintendent of production for Sun Oil Company's Rocky Mountain production division, Denver. He has been district superintendent of production for the West Texas district in the southwest division since November 1947.

Other southwest production division changes announced are: Cecil A. Colville, Midland, Texas, from assistant superintendent, West Texas district, to district superintendent succeeding Mr. Hamilton; E. Lloyd Kownslar, field superintendent, Colorado City, Texas, to assistant district superintendent, replacing Mr. Colville; and Nelson J. Sapp, Jr., foreman, Garcia Area, McAllen District, southwest Texas, to Colorado City replacing Mr. Kownslar. Colorado City is now an area office instead of a sub-district office.

C. C. Bengston, production superintendent, Calgary, Alberta, Canada, has been transferred to Midland, Texas, as assistant field superintendent. R. K. Beggs has succeeded P. S. Dudley, who retired July 1 as assistant field superintendent in charge of the Gainesville area in East Texas.

L. W. BENNETT, treasurer, Sunray Oil Corp., has been elected president of the Tulsa Control of the Controllers Institute of America. Thorwald L. Peterson, Loffland Bros. Co., was chosen vice president. Directors named include: Allyn R. Bell, Jr., past president of the group, who is controller, Deep Rock Oil Corp.; Glenn T. Bodman, assistant controller, Continental Oil Co., Ponca City, Okla.; and S. D. Williams, assistant controller, Sohio Petroleum Co., Oklahoma City.

At the annual meeting of the organization's New Orleans Control, Reuben F. Gray, Shell Oil Co., Inc., was elected president and Dee Davis, The California Co., was named a director.

R. L. HAZLETT, editor of the *Beacon*, employee magazine of The Ohio Oil Co., has been appointed assistant to M. S. Hauser, public relations manager. E. L. Price, assistant editor of the *Beacon*, succeeds Mr. Hazlett as editor.

Mr. Hazlett for eight years edited and published a weekly oil trade paper, *The Inland Oil Index*, Casper, Wyo., covering Rocky Mountain oil and gas industry news. He was executive secretary of the District IV Petroleum Industry Committee for War from 1941 to 1943. Following 18 months' Army service, he joined Ohio Oil as *Beacon* editor in 1946.

J. A. BOEGE has been appointed manager of Vernon, a new post in the manufacturing department of General Petroleum Corp. R. A. Baker will succeed him as manager of laboratories.

General Petroleum has had manufacturing facilities in the Vernon area of Los Angeles since 1913. While the company's principal refinery is now at Torrance, Calif., production and packaging of lubricating oils, greases and certain industrial chemicals are carried on at Vernon. The main process laboratory is located there also.

R. C. ALDEN, chairman of the research planning board of Phillips Petroleum Company's research and development department, has been elected vice chairman of the technical committee (D-2) on petroleum products and lubricants of the American Society of Testing Materials. Mr. Alden was named to complete the unexpired term of L. C. Beard, Jr., of Socony-Vacuum Oil Co., president of the Society for 1953-1954.

GEORGE P. WALKER, JR., Lafayette, La., district geologist for Continental Oil Co., has been promoted to division geologist with headquarters at Houston. He succeeds M. B. Morris, resigned. Phillip J. Lane, Corpus Christi, Texas, succeeds Mr. Walker.

LUKE W. FINLAY, Standard Oil Co. (N.J.) counsel, returned to his New York office in August after an 18-month leave of absence for both military and civilian government service in Europe. In January 1952, Brigadier General Finlay rejoined the Army to become chief of the procurement division of the Army's European headquarters at Heidelburg, as well as chairman of the Joint Coordinating Board for Off Shore Procurement, representing all the military services in Europe. In these two positions he headed the team which placed contracts in the fiscal year 1952 for the first major offshore procurement program in Europe. These contracts totaled $639.3 million of Mutual Security Program purchases. The Army's share of this was more than half.

Luke W. Finlay, left, with former Ambassador William H. Draper, S.R.E.

In June 1952, General Finlay left the military to become Minister for Defense Affairs in Europe under Ambassador William H. Draper, U. S. Special Representative in Europe. In this capacity he was responsible for preparing recommended programs for offshore procurement for the fiscal years 1953 and 1954 of more than a billion dollars each. In addition, under the U. S. Special Representative, he was responsible for: developing the NATO joint infrastructure program now approximating some two billion dollars of military construction in progress or programmed; initiating correlated European production programming under the auspices of the NATO international staff; and the Defense aspects of the NATO annual review, through which firm force goals and equipment targets are worked out for each of the 14 NATO partners, on the basis of which the entire U. S. military defense assistance program to NATO Europe is developed.

His work on NATO infrastructure and on the negotiations of military facilities for U. S. forces brought him into contact with the major projects for jet fuel pipe line and storage systems in Europe and gave him the opportunity to work closely with such special consultants on these projects as Charles Lockett of Standard Oil Co. and Sidney S. Smith of Shell Oil Co.

LESTER H. BARNES has been appointed assistant refinery superintendent in charge of the mechanical department at Continental Oil Company's Ponca City refinery. He succeeds H. G. Gunter, who has resigned from the company. Lloyd Thompson, chief planner, was promoted to mechanical superintendent succeeding Mr. Barnes. Mr. Barnes joined Conoco at Ponca City in 1928 and was made mechanical superintendent in 1950. Mr. Thompson joined Conoco at Ponca City in 1937 and was promoted in 1950 to chief planner at the Ponca City refinery.

MARGARET M. FEENEY has been elected secretary of Esso Export Corp. She has been with the Jersey Standard organization for eight years. She has served as secretary of Esso Export's executive committee since 1948 and as assistant corporation secretary for the past two years. Her election gives the Jersey Standard organization its fourth woman corporate officer.

T. A. VAN GRIETHUYSEN has been elected a vice president of Continental Oil Company in charge of transportation and supplies, it is announced by President L. F. McCollum. He will direct crude oil trading transportation, purchasing and pipe line operation with headquarters at Houston.

AUGUSTUS C. LONG, president of The Texas Company, has been elected a director of Seaboard Oil Co. of Delaware to fill the vacancy resulting from the resignation of Col. Harry T. Klien, former Texaco president, who had been a director of Seaboard since 1933.

H. L. PHILLIPS has been elected chairman of Sinclair Oil & Gas Company, crude oil producing subsidiary of Sinclair Oil Corporation. The board also elected H. B. Smith president and chief executive officer of the company to succeed Mr. Phillips. The executive offices will be maintained in Tulsa, under the direction of H. B. Smith, president, and J. W. Jordan, executive vice president.

Mr. Phillips, who has been president of the producing company since 1930, joined Sinclair Oil & Refining Company in its legal department in July 1916. In 1922, he was made president of Sinclair Crude Oil Purchasing Co., assuming the presidency of Sinclair Oil & Gas Company in October 1930. He is a director of Sinclair Oil Corp., the National Bank of Tulsa, the Great Lakes Pipe Line Co., Platte Pipe Line Co. and the American Petroleum Institute.

Mr. Smith, who succeeds Mr. Phillips as president, joined Sinclair Oil & Gas Co. in the land department in 1919, following service in World War I, and has devoted his entire business life to exploration and production. Elected a vice-president of the production company in 1922, he was made executive vice-president in May 1952.

Mr. Jordan jointed Sinclair-Cudahy Pipe Line in June 1916, transferring to the producing company in 1919 on his return from World War I. After serving as division superintendent in various areas, he was appointed assistant to the chairman in 1938 and in 1940 was made general superintendent. In 1941, he was elected vice president in charge of production, and in May 1952 was named executive vice president.

H. L. Phillips

H. B. Smith

J. W. Jordan

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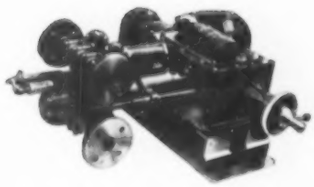

Duplex high-duty pump with mechanically operated suction valves.

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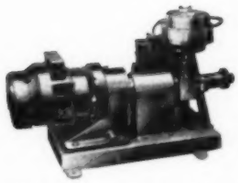
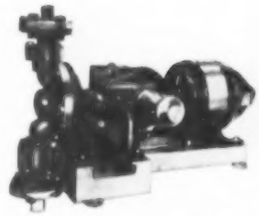


Single-stage gas pump. Suction 75 mm. Hg absolute to delivery press.: 5 lb. per sq. inch gauge.

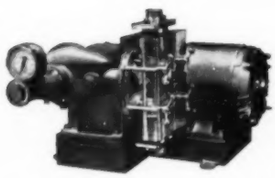
DIAPHRAGM PUMPS in single units are made in a range of standard sizes covering capacities of from 1 to 1,000 gals. per hour at normal pressures. These pumps are made also as multiple units.
HYDRAULICALLY operated diaphragm pumps are supplied for pressures up to 1,500 lb. per square inch.
DIAPHRAGM PUMPS for circulating GASES at moderate differentials are constructed for pressures up to 1,000 lb. per square inch, and in single, double and treble stage units for dealing with rare gases under high vacuum and delivering under pressure to gas analysis equipment.



Standard G.250 diaphragm pump with micro-variable control.

PLUNGER PUMPS as single units with ram diameters of from $\frac{1}{16}$-in. dia. to 4-in. dia. and capacities of from 5 ml. to 500 gallons per hour and pressures up to 20,000 lb. per square inch.
DUPLEX and **TREBLE** ram units of similar ram sizes are built with capacities of 1,400 and 2,100 gallons per hour and with reduced capacities against pressures up to 20,000 lb. per square inch.

PUMPS are available in a wide range of chemical-resistant materials and include various grades of stainless steel, monel metal, bronze, aluminium, glass-lined cast iron, ceramics, ebonite, Perspex, polythene, etc. Diaphragms are supplied in many resistant materials, including silicone rubbers and polytetrafluoroethylene.



Diaphragm pump micro-capacity control with dial-type stroke adjustment indicator.

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MULTIPLE pump sets of up to eight pumps, driven by one motor for a complete process, each pump fitted with independent capacity control and the volume of the mixture can be varied whilst maintaining the blend by the use of a variable-speed motor which can be automatically controlled if required.

Standard G.250 plunger pump. Low-pressure type with micro-control.

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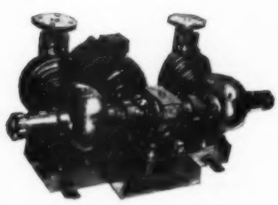
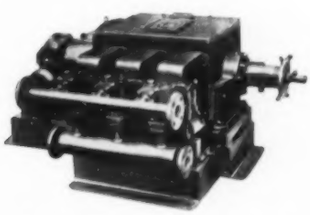
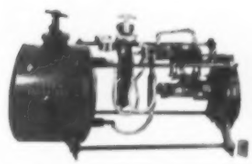


Twin G.250 diaphragm pumps. Can be supplied in multiple units of eight or ten pumps.



Treble plunger pump with micro-variable volume control. High volumetric efficiency straight-line variable capacity



Pneumatic chemical feeder driven by natural gas or compressed air

R. B. Wing

ROBERT B. WING has been appointed area exploration manager for Shell Oil Company, with headquarters at Calgary, Canada. He replaces H. Koch, who has been transferred to the Los Angeles area. A native of South Dakota, Mr. Wing joined the Shell organization in 1934 and conducted subsurface studies in Oklahoma and North Texas until 1941, when he joined the U. S. Army, serving as a colonel on General Patton's staff at the time of his release in 1945. He rejoined Shell as an area geologist, and in 1952 was made division exploration manager at Casper, Wyoming, holding that position until his present appointment.

LEONARD W. HEINY, Salt Lake City, Utah geologist for Continental Oil Co., has been promoted to assistant division geologist with headquarters at Billings. He joined Continental in 1949 as a geologist at Casper, Wyo. and served one year with Conoco at Elko, Nev. prior to his transfer to Salt Lake City in 1951.

NELL C. GIESEN, who spent her entire 38-year business career in tanker terminal operations for the American Oil Company's deepwater terminal at Carteret, N. J., was presented with a gold wrist watch by Herschel C. Smith, company president, at a recent retirement dinner attended by company officials and fellow workers. Miss Giesen was chief clerk when she retired. For four months in 1918 she served as acting superintendent of the terminal, probably the only woman ever to hold such a post.

J. M. LLOYD has been elected vice president and general manager of the Rio Bravo Oil Co. to succeed the late Sid T. Childress. Mr. Lloyd has been right-of-way agent for Southern Pacific Lines for the past 27 years.

WILLIAM F. BROWN, petroleum geologist of Mt. Pleasant, Mich., and John G. Staudt, executive vice president of Dowell Incorporated, of Tulsa, have been elected directors of the Brazos Oil and Gas Co. At the same time, Calvin A. Campbell of Midland, Mich., retired from the board. Brazos is a subsidiary of the Dow Chemical Company engaged in petroleum exploration. The president of Brazos Oil and Gas is Dr. A. P. Beutel, Dow vice president and general manager of Dow's Texas division at Freeport.

W. F. Brown *J. G. Staudt*

E. J. Brueggemann

E. J. BRUEGGEMANN, a veteran of 29 years of service, has been named manager of the tank car department of Gulf Oil Corp., succeeding J. H. Ryan, retired. Mr. Brueggemann will be responsible for the operation of the 2,100-tank car fleet owned or leased by Gulf and the nine tank car repair shops in Gulf's transportation territory.

OLEN LANE, Los Angeles, Calif., western region general manager for Continental Oil Co., has been elected a vice president by the company's board of directors. He will continue to serve as Conoco's western region general manager, with headquarters in Los Angeles.

HAROLD D. HANSEN has been appointed petroleum engineer for the Colorado-Nebraska field of The British American Oil Producing Company's northwestern district. Mr. Hansen joined British American after nearly seven years in Peru and Colombia with the International Petroleum Co., Ltd.

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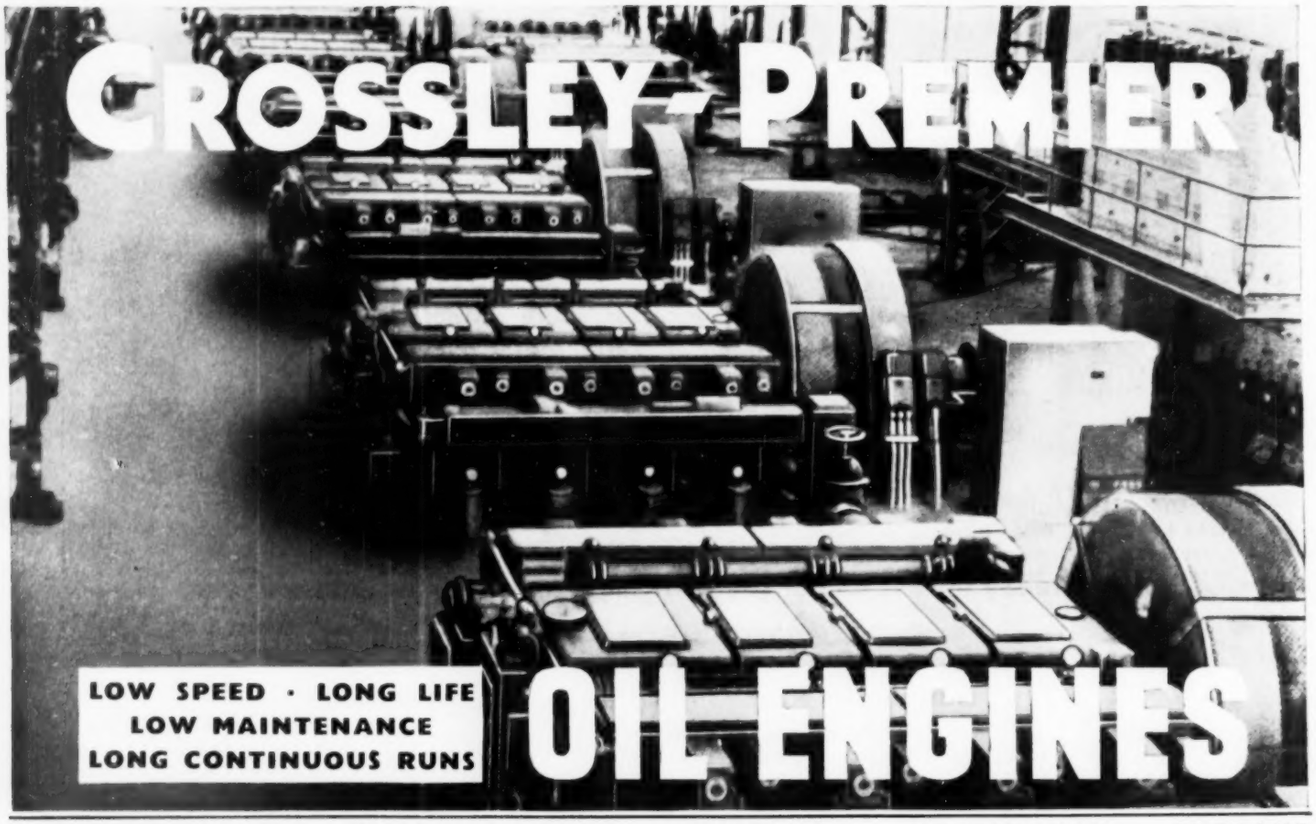

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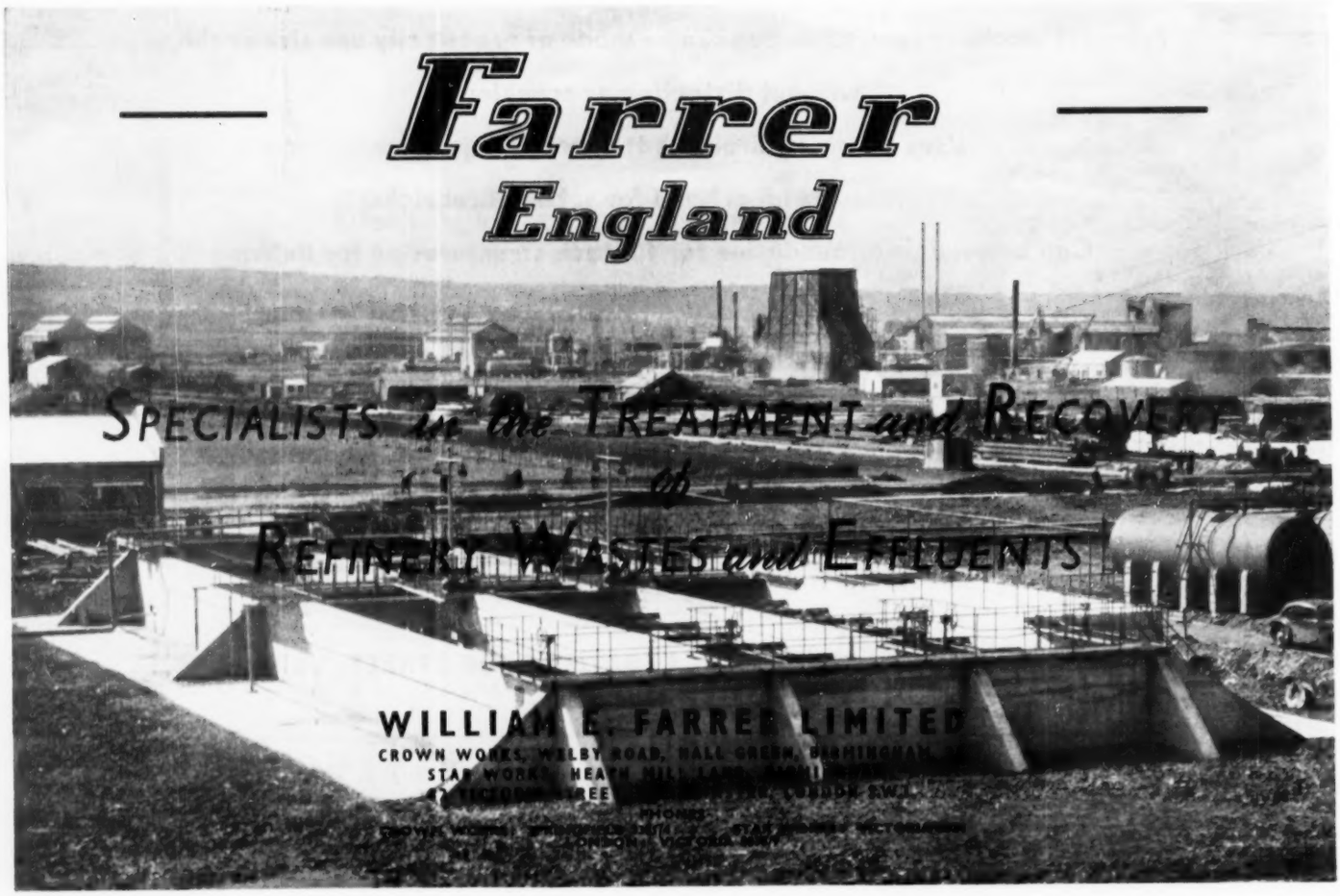

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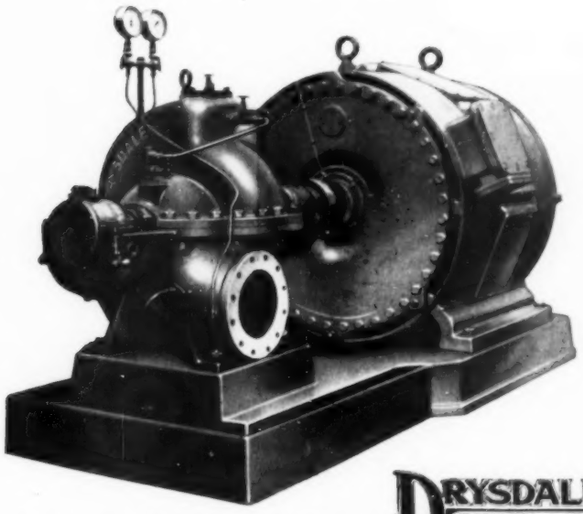

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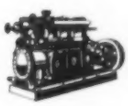

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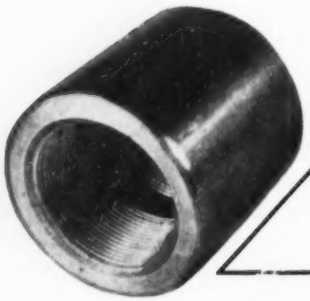

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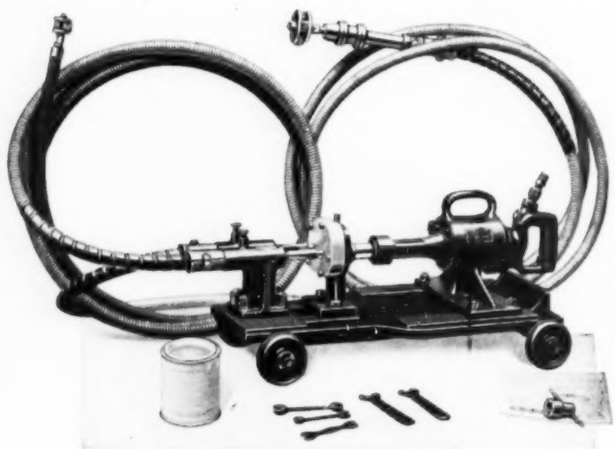

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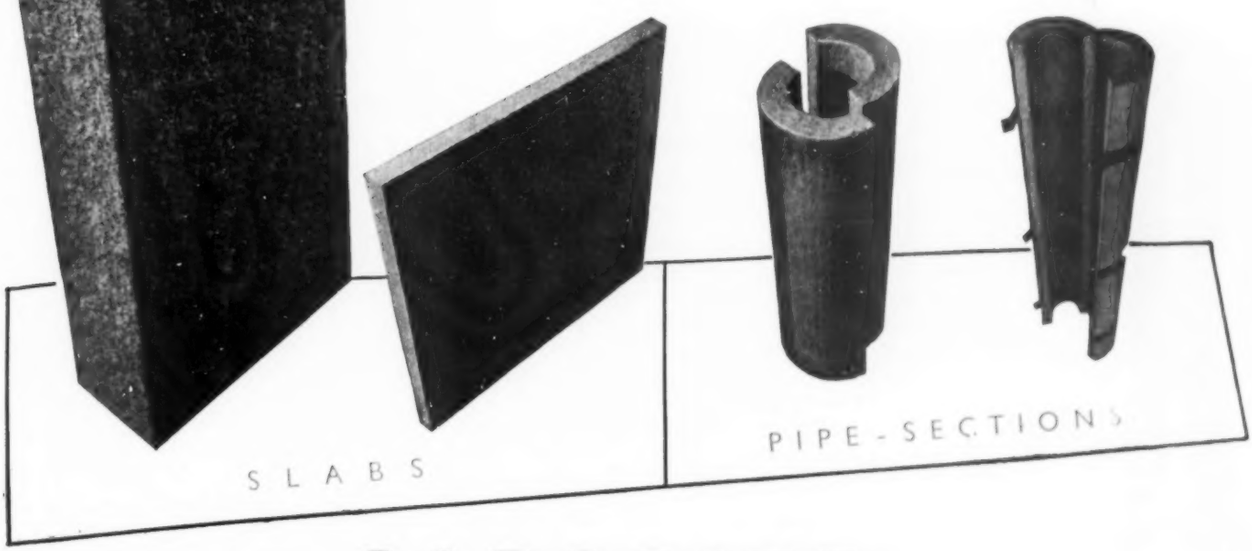

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Platte Pipe Line Has Formal Opening

The United States cannot afford to gamble with with the chance of an oil shortage, was the warning voiced by President Frank M. Porter of the American Petroleum Institute, speaking at the formal dedication of the Platte Pipe Line which took place at Casper, Wyoming on August 8. To keep exploratory activity at a high level, said Mr. Porter, "there must be commensurate exposure to rewards for the risk-taking explorers.

"The Congress of the United States in 1926 recognized the need for incentives when it enacted into the income tax law the percentage depletion provision. This sound, farsighted tax policy has over the years been of the greatest importance in making available to the nation a plentiful supply of low-cost petroleum products by attracting capital and enabling operators, large and small, to plow back income in order to continue and expand the hazardous and increasingly costly search for new oil resources.

"The very problems that made mandatory this action on the part of Congress have become more numerous and heavier instead of fewer and lighter. The country has been fortunate in that the tax laws do provide recognition for the depletion of the operators' capital assets."

Other speakers at the dedication hailed the opening of the 1,149-mile, 20-inch pipe line, with its daily capacity of 110,000 barrels which connects Wyoming fields with refineries at Wood River, Illinois, as marking a milestone in the development of petroleum production in the Rocky Mountain area.

"The vast petroleum resources of the Rocky Mountains have been integrated into North America's over-all petroleum mobilization picture by the completion and daily operation of this pipe line," said Senator Butler of Nebraska. "These petroleum resources, from an area which geologists label the most promising remaining dryland oil province in our country, are essential to the state of ever-readiness which must be maintained. Privately managed industry has come forth again with a progressive, modern engineering accomplishment which adds strategic strength to our nation."

Millard K. Neptune, president of Platte Pipe Line Co., introduced the speakers and presided at the ceremonies which were attended by several hundred guests including many prominent figures in the oil industry. Mr. Neptune was the recipient of hundreds of congratulatory messages on the successful completion of the line, which in three years has progressed from the blueprint to the operating stage. The five interests participating in the building of the line are the British-American, Continental, Ohio, Pure Oil and Sinclair companies.

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A limited number of this type bits were ordered for test. They have now been proven to be definitely superior and more economical for use than our former type. It is expected that more holes can be drilled when using these bits, thus improving the output of the seismic party. Hence a "RUSH" order to effect a change-over as soon as possible.

This oil company couldn't afford to use up their existing stock of bits. They knew, after their own tests, that it would be more economical to switch immediately to Blue Demons for their shot hole operations . . . and get extra footage at lower cost. Hawthorne Bits get more footage faster . . . drilling through hard stringers, interbedded shales and clays . . . drilling 90% of the medium and hard formations as easily as roller bits costing six times more . . . drilling all formations faster than ordinary drag bits and getting more than five times the footage per bit . . . saving round trip time formerly required for soft- to hard-formation bit change. Join the ever-growing ranks of oil companies that have standardized on Blue Demon Bits. Don't wait to use up your present stock of bits, test Blue Demons on your rigs right away and see.

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Company Earnings Higher

Net income of 40 American oil companies in the first half of 1953 totaled $1,046,492,000 compared with $1,029,389,000 in the first six months of 1952. The increase in earnings was 1.7 percent.

In a number of instances, first half earnings this year deviated sharply from the net reported a year ago. Some of these divergences were caused by depressed earnings in the second quarter of 1952 due to strike shutdowns. Other changes resulted from special situations such as nonrecurring profits.

Companies showing substantial gains included Derby Oil Co., with earnings 50 percent higher in the first six months of 1953 than in 1952; Union Oil Co., 33.5 percent higher; Amerada, 34.5 percent higher; Wilcox Oil and Gas, 27 percent; Shell Oil Co., 19 percent; Continental Oil Co., 17 percent; Sunray, 16 percent; Tide Water Associated, 14.5 percent; and Standard Oil Co. of Ohio, 10 percent.

A number of companies had sharply lower earnings. Pure Oil Co. was off 22.2 percent; International Petroleum, 23.4 percent; and Mid-Continent Petroleum Corp., 14 percent.

Details for the 40 companies follow:

	SECOND QUARTER NET INCOME (Thousands of Dollars)		PER SHARE OF COMMON	
	1953	1952	1953	1952
Anderson Prichard	2,116	2,191	2.60	2.69
Amerada	$ 7,962	$ 5,916	$2.52	$1.88
Ashland	1,880	3,489	.27	.61
Bishop Oil	843	841	.27	.14
Cities Service	28,121	28,385	7.30	6.98
Continental Oil	19,994	17,099	2.05	1.76
Derby Oil	543	362	1.17	.78
Derby Oil	543	361	1.17	.78
Gulf Oil	75,761	66,981	3.21	2.95
Humble Oil & Ref.	79,532	74,992	2.22	2.09
Houston Oil Co. of Texas	3,352	3,010	2.52	2.28
Imperial Oil	20,006	19,204	.67	.64
International Petroleum Co. Ltd.	12,000	14,800	.83	1.02
Lion Oil	5,246	5,548	1.70	1.80
Mid Continent	7,167	8,161	3.86	4.39
Middle States	1,180	1,104	.53	.49
Pacific Western	4,988	4,534	1.42	1.11
Panhandle	394	509	.25	.32
Pure Oil	11,297	13,816	2.51	3.19
Ohio Oil	20,400	20,361	3.11	3.10
Quaker Oil	967	875	1.04	.96
Richfield Oil	12,989	11,731	3.25	2.93
Shell Oil	50,744	42,556	3.77	3.16
Sinclair Oil	30,279	35,274	2.47	2.88
Skelly Oil Co.	13,723	13,225	4.77	4.62
Socony Vacuum	88,000	84,000	2.51	2.64
Std. Oil Co. (Calif.)	91,374	87,160	3.19	3.04
Std. Oil Co. (Ind.)	54,742	57,814	3.56	3.76
Std. Oil Co. (Ky.)	5,239	4,861	2.01	1.87
Std. Oil Co. (N.J.)	261,000	265,000	4.31	4.37
Std. Oil Co. (Ohio)	8,506	7,736	2.02	1.82
Sunray Oil	13,218	11,364	1.29	1.14
Swan Finch Prod.	18	11	.44	.23
Tide Water Assoc.	17,591	15,355	1.37	1.20
The Texas Co.	85,780	83,768	3.13	3.05
Texas Gulf Prod.	1,789	1,636	1.62	1.48
Union Oil Co. of California	17,807	13,333	3.30	2.46
Universal Conso.	1,146	686	1.96	1.18
Venezuela Oil	1,232	1,227	.30	.30
Wilcox Oil Co.	481	379	1.71	1.35
TOTAL	$1,046,492	$1,029,389		
INCREASE	1.7%			

(d) deficit

Edwin S. Hall

Edwin S. Hall, 66, former director, vice president and general counsel of Esso Standard Oil Co., died August 13 at Farmington, Maine after a short illness. Mr. Hall retired in February 1950, after 30 years service with Esso and its parent company, the Standard Oil Co. (N.J.). A leading figure in the founding of the American Petroleum Industries Committee, Mr. Hall served as its secretary from its inception in 1932 until 1944 and as chairman from 1944 to 1949.

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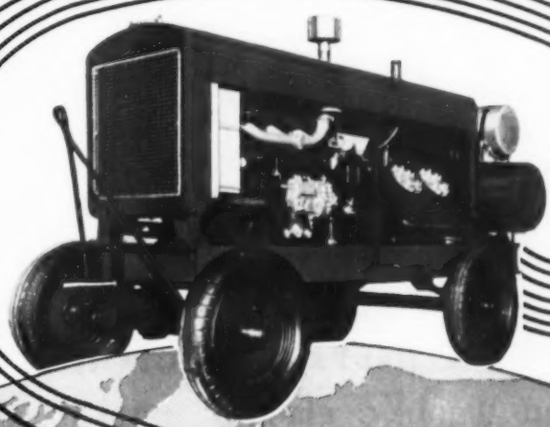

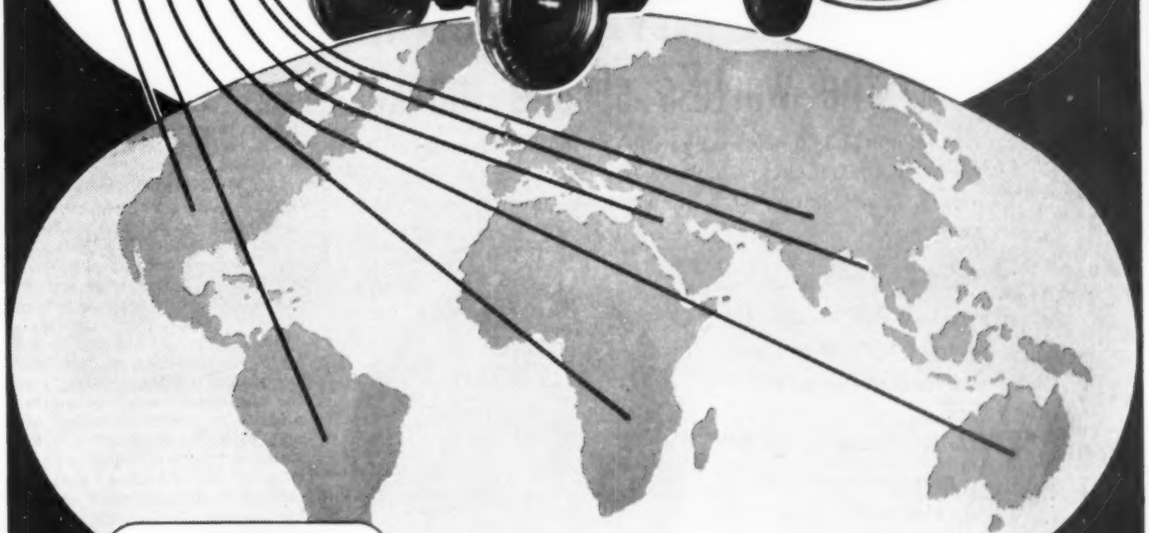

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AGENCY OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

World Oil Consumption Up 6.6 Percent

(Continued from page 65)

may have an increase of about 16 percent this year, a rate about double that forecast for the United Kingdom or France and well above Italy. The French estimates may be badly off by the end of the year if current labor difficulties continue to disrupt the economy.

U.S.S.R. output of petroleum in 1952, as recently reported by Premier Malenkov, will be 1,040,000 b/d, an increase of about 9.5 percent over last year. Output of satellite countries currently is estimated at 168,000 b/d, an increase of about five percent over last year. The increase is confined largely to Austria where two new fields have been found.

The 1,208,000 b/d supply available to the Soviet nations appears to be somewhat greater than internal demand, as it is managed by authorities to exclude virtually all civilian use. It has been estimated that oil stocks increased last year and are continuing to expand in 1953. Credence is given this estimate by recent sales activity of the Russians. Last year the Soviet nations shipped about 7,200 b/d of oil products to Finland, nearly half of that country's requirements. In addition, it shipped about 10,000 b/d to other European countries, notably Italy. Smaller shipments have been made to Belgium, Germany, Norway, and Denmark. *Petroleum Press Service*, in a recent survey of Russian oil trade, reported that offers of oil are being made to Argentina and Iceland, among others, in exchange for fish, meat, wool, linseed oil and hides. Much of the exported oil is being supplied by Romania rather than by Russia proper.

Estimates of 1953 consumption by major nations and geographical areas as shown in the table on page 65 of this issue are based on crude and natural gasoline required rather than on a "major products" basis. When compared with first half-year production figures, it appears that the international industry is in fairly good balance.

In both 1951 and 1952, the international industry added to storage. The excess of supply over demand in 1952 has been estimated at about 270,000 b/d, or roughly 100 million barrels. In the United States, the increase in stock last year was 39,645,000 barrels. Canada reported an increase of 5.3 million barrels. The filling of new pipe lines absorbed a very substantial quantity of oil, particularly in Iraq.

In the first half of 1953, world crude production has been estimated at about 12,840,000 b/d and natural gasoline and condensate at 750,000 b/d. New supply thus is at about 13,590,000 b/d, or approximately at the level of estimated world demand.

As this is written, it is not clear what effect the cessation of hostilities in Korea may have on global oil consumption. It has been generally calculated that the military has been consuming about five percent of the world's oil supply. Current thought among economists is that the halt in fighting will not have a significant effect on demand since a very large part of military consumption will continue in maintenance and training operations until such time as international tensions are eased.

The pattern of intercontinental flow of oil in 1952 continued the trend which has been apparent since the war. Expansion of production in the eastern hemisphere has decreased the net flow from the west each year. In 1952, the net flow from west to east was about 440,000 b/d, compared with 540,000 b/d in 1951. The most noteworthy change was in the movement of oil from the Caribbean to Europe, which dropped from 430,000 b/d in 1951 to 340,000 b/d in 1952.

Caribbean producing countries made up their loss in European business by shipping larger quantities of oil to the southern part of South America, principally Brazil and Argentina. The increase in this movement was about 20,000 b/d. At the same time, shipments to the United States increased about 60,000 b/d to 740,000 b/d, and Canada imported an additional 10,000 b/d.

Movement of oil from the Middle East to Europe approximated 1,300,000 b/d in 1952. A substantial part of this oil was processed in European refineries and re-exported to Africa and other areas. Net Middle East oil consumed in Europe was in the neighborhood of 1,100,000 b/d, an increase of perhaps 200,000 b/d over 1951.

Indications are that the 1952 trend is continuing this year with diminished net movement of oil from the western to eastern hemispheres as the Middle East continues to expand its output at a rate faster than consumption.

The world-wide increase in utilization of petroleum continues at a rate in line with the historic background of the industry's progress, although the phenomenal spurt in consumption of the immediate post-war years has leveled off. There may be some reduction in military requirements which will tend to limit expansion of petroleum sales in the immediate future, but the general outlook is for continued steady growth such as has marked the industry throughout its history.

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In 1952, 2½ million tons of petroleum were handled at Avonmouth. During 1945 imports alone topped 4¾ million tons—a world record.

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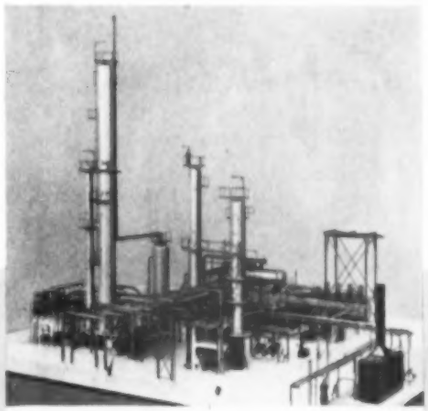
Book Review

Decimal System for Classifying Data Pertaining to the Petroleum Industry, by Lester C. Uren; published 1953 by University of California Press, Berkeley, Calif.; 92 large pages; $2.50.

Systematic filing and indexing of technical papers, reports, notes, catalogs, clippings, maps, drawings, etc. is a problem that concerns every engineer and is a matter of importance in every oil company office. As time goes on and these things accumulate, it is apt to be forgotten where they have been filed, and much time is likely to be lost in searching for them. Dr. Uren, himself a busy teacher and consultant, has to have at his command a vast number of details. To keep track of this material he has compiled this revised edition of his previous decimal classifications designed especially to meet the needs of oil men. The system is very simple and is flexible enough to include thousands of separate items in readily accessible form.

New Alkylation Unit Completed by McKee

THE COMPLETED UNIT shown below was recently put on stream. Capacity is 7,000 barrels of charge thruput per stream day. It is one of four alkylation units under construction simultaneously by McKee and is the 58th time this refiner has employed McKee engineering services.



THIS SCALE MODEL, built from engineering drawings to a scale of ¼ inch to 1 foot was used to help check engineering and purchasing and to aid construction crews in the interpretation of engineering drawings. It gave the refiner a clear understanding of his project in advance and is valuable in training operating personnel.

McKEE ENGINEERING leaves no stone unturned, no method unexplored in our constant effort to design and construct the most efficient plant in the shortest possible time and at lowest possible cost.

The use of scale models is only one example of how this organization utilizes every device available to make sure "*McKee Engineering means Assured Results.*" That's why refiners all over the world use McKee services again and again.

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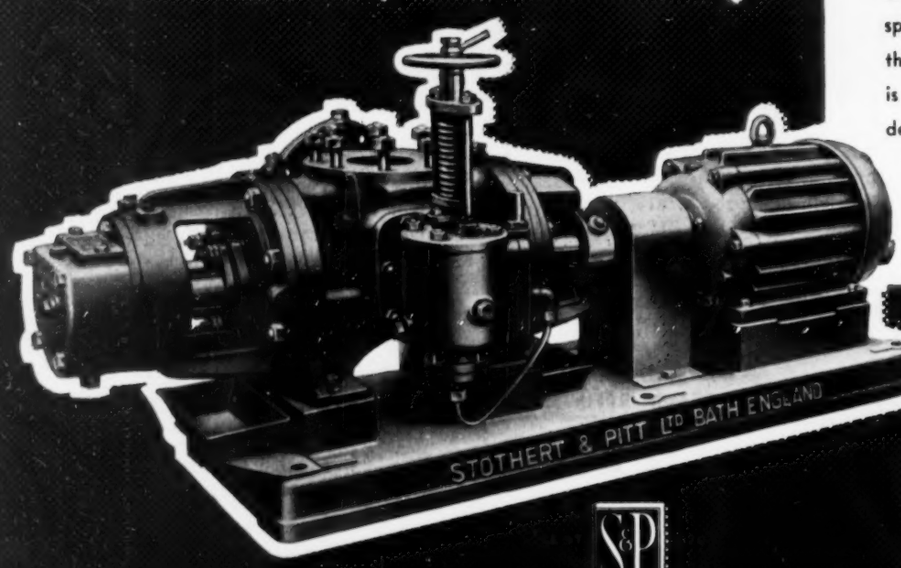
Aviation Spirit Pump



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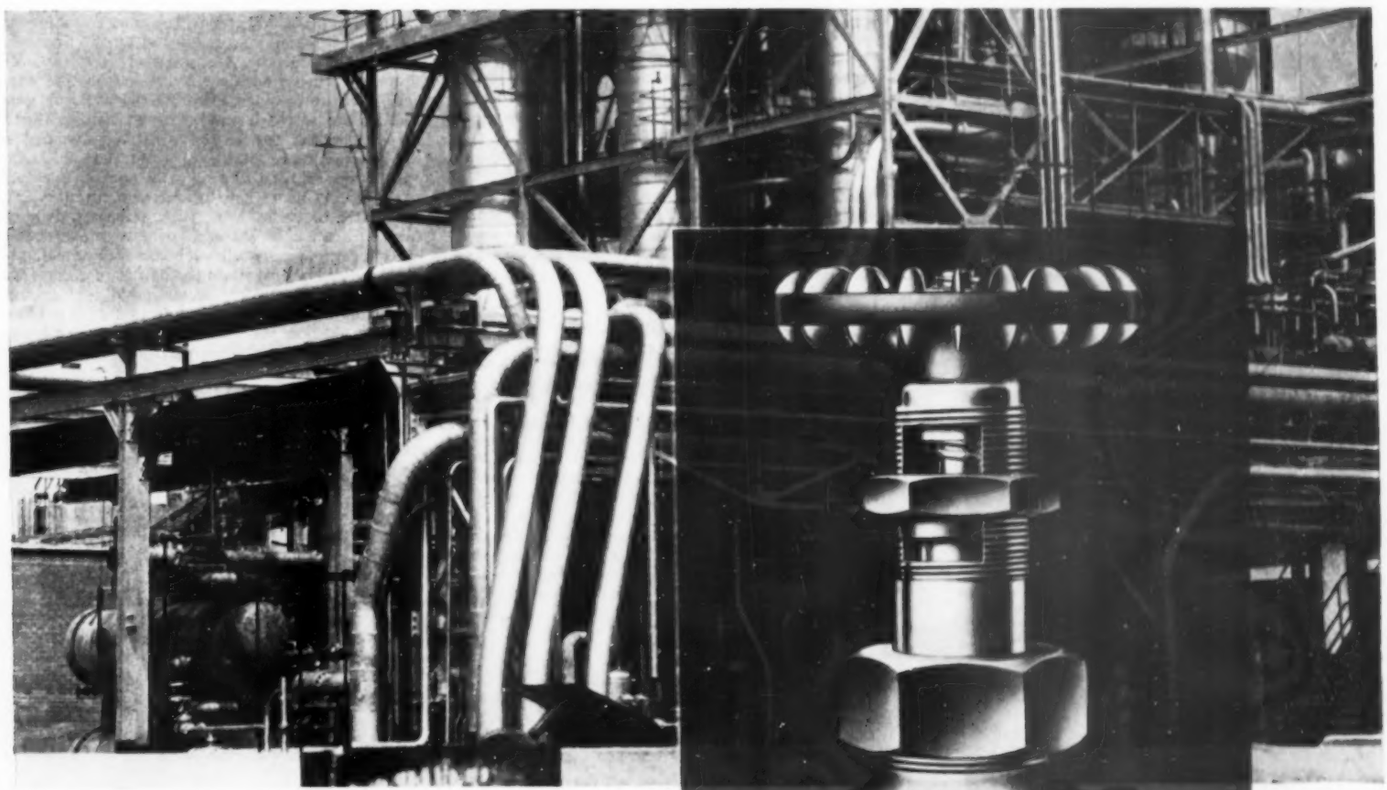

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R. F. Carlson

W. F. Goertz

W. O. Cook

Heads Eastern Sales

Appointment of Robert W. Smith as eastern division sales manager has recently been announced by O. J. McCullough, vice-president, McCullough Tool Co. Mr. Smith joined McCullough as a field operator in 1946, later transferring to the sales department. In 1950 he was appointed eastern division public relations director, a position he held until his new appointment as sales manager. He will continue to work out of division headquarters at Houston, supervising 25 eastern division branches located in Texas, Arkansas, Louisiana, Mississippi, New Mexico and Oklahoma.

Joins API Production Division

Roy F. Carlson joined the staff of the division of production of the American Petroleum Institute in Dallas as assistant to the director effective August 1. He is in charge of the division's drilling and production practice program and district activities. Mr. Carlson has been a member of the editorial staff of the *Oil & Gas Journal* since 1948. His most recent assignment has been west Texas editor for the journal. Previously he was employed by Phillips Petroleum Co.

The appointment of the new assistant to the director rounds out the changes in the division of production staff resulting from the retirement of C. A. Young as director. William H. Strange succeeded Mr. Young as director early in July. Other assignments of staff personnel to major activities of the division remain as before, with Edwin Joyce, assistant director, administering the oil field equipment standardization program, and Forrest Smith, training administrator, coordinating the vocational training and supervisory development programs.

Heads Axelson Sales

Willard F. Goertz has been named general sales manager of the Axelson Manufacturing Co., division of the Pressed Steel Car Co., Inc. Joining Axelson soon after graduation from U.C.L.A. in 1927, Mr. Goertz has served continuously with the company since then, working his way through a series of promotions from his first job, oil well pump inspector, to the post of California sales manager, to which he was appointed in 1950.

In his new position, Mr. Goertz will be assisted by J. R. Walker, sales manager, petroleum equipment division; J. L. Axelson, sales manager, engine lathes division; L. G. Martial, sales manager, aircraft components division; and G. Painter, sales manager, foundry division.

Jefferson Chemical Elects New Directors

At a recent meeting of the directors of Jefferson Chemical Co., three new members were elected. They are W. P. Gee, assistant to the president, The Texas Co.; L. C. Duncan, assistant to the president, American Cyanamid Co.; and S. C. Moody, vice president, American Cyanamid Co.

The Jefferson board now consists of the following representatives of the two joint owners of Jefferson: L. C. Duncan, W. P. Gee, M. Halpern, J. S. Leach, A. C. Long, W. E. Kuhn, S. C. Moody, L. C. Perkinson, R. L. Saunders, W. M. Stratford, R. C. Swain, K. C. Towe and M. C. Whitaker. P. M. Dinkins, president of Jefferson Chemical Co., is also a member of the board of directors.

Elected Ideco Vice President

J. B. O'Connor, executive vice president, Dresser Industries, Inc., Dallas, has announced the election of W. O. Cook as vice president of the Ideco division. Mr. Cook joined Ideco in 1934 as design engineer and from 1940 to 1946 was director of engineering. He was appointed assistant general manager and later succeeded Richard R. Bloss as general manager of Ideco's manufacturing plant at Beaumont. In his new capacity, he will continue to serve as general manager in charge of Ideco's Beaumont (Texas) plant.

Funds Asked for PAD

The Petroleum Administration for Defense, which was created shortly after the outbreak of the Korean war, is seeking funds to maintain a staff of 98 persons in the fiscal year that opened July 1, 1953. The personnel total would include 21 oil industry executives serving without compensation from the government. At its peak the agency had more than 300 on its staff and the appropriation required is greatly reduced from former years but in the present mood of Congress it may be cut further.

Explaining the job ahead, J. Ed Warren, retiring deputy head of the agency, said the tasks are to work with the military to obtain adequate supplies of aviation gasoline, to carry on wartime planning for the National Security Council on the supply of petroleum and to recommend expansion projects for accelerated tax amortization, among other things.

Of the foreign petroleum division, Mr. Warren said, "We have or have had under the Defense Production Act the responsibility of the free world with regard to the petroleum defense effort. There is a lot of petroleum secured for the defense effort in foreign areas.

"We have a committee set up under a voluntary agreement, which was requested by the Secretary of Interior and the Secretary of Defense. The Committee deals with the aviation gasoline situation, because 85 percent of all the aviation gasoline in the world is made in the United States. Export quotas for avgas are recommended on the basis of these studies in order that shipments out of the United States will not be excessive when we are short here in our own country. The committee meets in New York, supervised by the foreign branch of PAD. Then we make studies of refining capacity all over the free world, production, and the availability of production. This statistical information is available and is used in strategic studies pertinent to the defense effort.

"Then, also in the foreign branch, we represent the government so far as petroleum is concerned in the NATO organization. The assistant deputy administrator is a member of the Petroleum Planning Committee of NATO, and our program director is chairman of the NATO working committee on petroleum planning."

Haven Retires as McKee Vice President

William A. Haven has retired as vice president of Arthur G. McKee & Co., but will continue as a director. He has been in charge of the company's metals division. Mr. Haven has been a vice president of the company for the past 25 years.

McKee directors elected Merrill Cox, vice president, metals division, administration and sales, and A. L. Foell, vice president, metals division, in charge of engineering. Both Mr. Cox and Mr. Foell have been with the company for 24 years.

To Enlarge Amarillo Refinery

S. W. Johnson, superintendent of The Texas Company's Amarillo, Texas refinery, has announced an extensive modernization and expansion project for that plant. The crude capacity will be increased to 15,500 b/d. An Orthoflow fluid catalytic cracking unit, a catalytic reformer, a delayed coker, a catalytic polymerization unit, and an alkylation unit will be built. The M. W. Kellogg Co. is major contractor.

Named Assistant Secretary of Labor

Rocco C. Siciliano, supervisor of labor relations for Procon, Inc., has been confirmed by the U. S. Senate as an assistant secretary of labor. He was legal assistant to a member of the National Labor Relations Board in Washington before joining Procon three years ago.

Joins Lummus Company

Virgil D. Drummond has joined The Lummus Company as assistant to Dr. E. R. Smoley, vice president, and will be engaged in sales engineering work.

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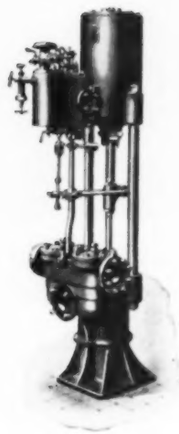

"Hall" Boiler Feed Pumps are designed to make use of every unit of energy from steam before it is passed to exhaust. Of the Vertical Single Cylinder Direct and Double-Acting type, the standard range covers capacities from 250 to 10,000 gallons per hour. Over 50 years specialist experience is behind these pumps, plus first class materials and workmanship. TURBINE Driven Centrifugal Feed pumps are available for duties from 4,000 to 35,000 gallons per hour.

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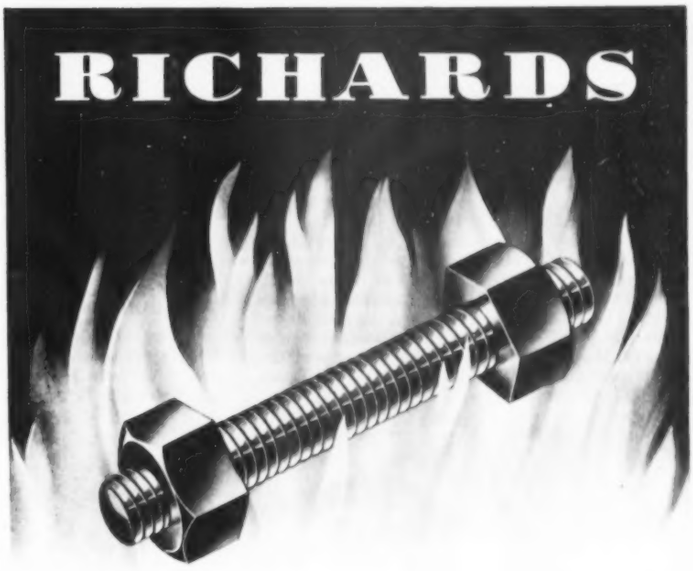

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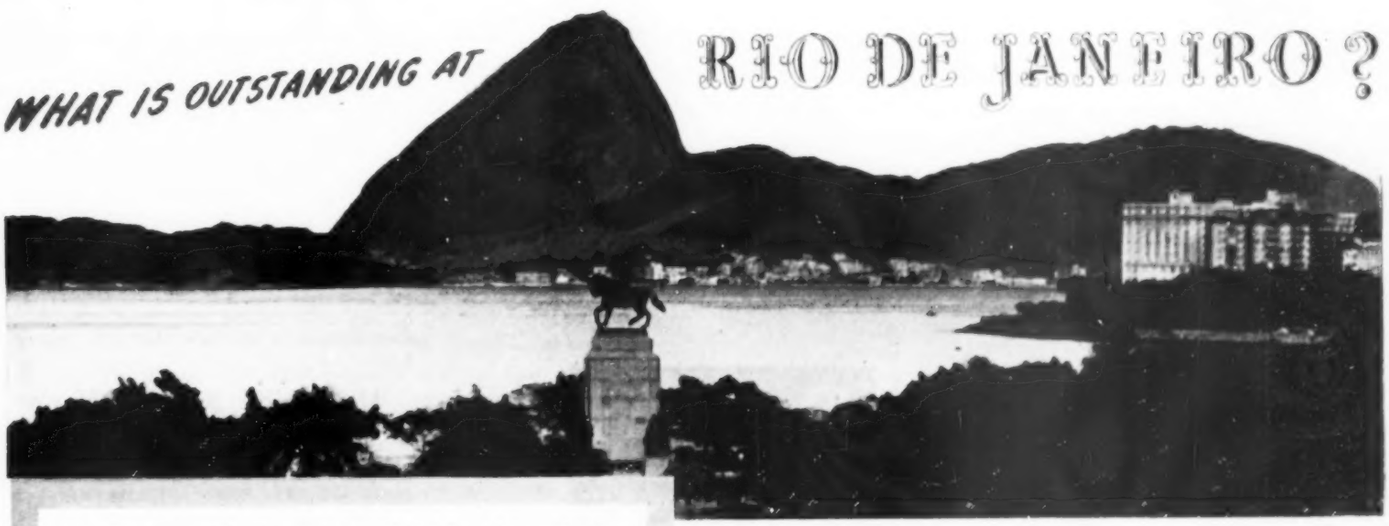
WHAT IS OUTSTANDING AT RIO DE JANEIRO?



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HAMBURG	GERMANY	RIO DE JANEIRO	BRAZIL		

GSI Training Program

A program of collaboration between educational institutions and members of the oil industry is resulting in summer training in geophysical exploration for students from 15 colleges and universities of the United States.

Twenty-eight students are taking part in the third annual GSI Student Cooperative Plan. They are spending their summer vacation periods gaining on-the-job experience in geophysics with GSI seismograph field parties.

Before going to their summer assignments, the students attended an orientation conference on geophysical exploration in Dallas June 16-20. Companies furnishing the conference program were: The Atlantic Refining Co., Concho Petroleum Co., DeGolyer and MacNaughton, Geophysical Service Inc., Magnolia Petroleum Co., Seaboard Oil Co., Standard Oil Co. of Texas, Sun Oil Co., and Texas Instruments, Inc.

Measuring Equipment Catalog

A new revised edition of the General Electric Company's 64-page measuring equipment catalog, GEC-1016A, containing information on more than 115 testing and measuring devices for laboratory and production line use, has been announced as available from the company at Schenectady 5, N. Y. The publication contains information on products ranging from simple current indicators to completely automatic oscillographs; from surface roughness scales to mass spectrometers; and from d-c amplifiers to radiation monitors.

Lummus Company Appointment

James H. Curtis has been appointed assistant to the president of The Lummus Company. He was formerly general manager of manufacturing for General Petroleum Corp.

silent revolution

"Change is a permanent condition" is a saying that applies to the world today and to the work of chemical engineering in that world. New plastics, high alloy steels, light metals, cements, ceramics, synthetic textiles, paints, fertilisers, adhesives, resins, drugs and dyes . . . is there anything that remains untouched by the Chemical Revolution? It is a silent revolution. The new fabric is accepted, indeed acclaimed, but the acclaim is for itself alone. The miracle in their midst—the remaking of the world—remains unseen by those it will benefit most. Surprises, new inter-connexions, new vistas of opportunity arise at every turn. Plan for them, accept them, welcome them, cause them to happen...

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D. D. Bovaird *R. S. Durkee*

Petroleum Equipment Suppliers Meet

At the annual meeting of the Petroleum Equipment Suppliers' Association held in Colorado Springs, Colo., during the final week of June, Davis D. Bovaird of the Bovaird Supply Company, Tulsa, was elected president for the ensuing year and Rodney S. Durkee, head of Lane Wells Company, Los Angeles, was named vice president.

Viscosity and Density of Lubes

Recent experimental work has resulted in comprehensive data on the viscosity and density of more than 40 lubrication fluids at temperatures from 32 to 425°F and at pressures up to 150,000 psi.

These new data are presented in two volumes entitled "Pressure-Viscosity Report" issued by the Research Committee on Lubrication of The American Society of Mechanical Engineers. Copies of the Pressure-Viscosity Report may be obtained at $10 the complete copy from the Research Department of The American Society of Mechanical Engineers, 20 West 39th Street, New York 18, N. Y.

The pressure - temperature - viscosity - density portions of the data have been entered on IBM punch cards and sets of these cards may be obtained from the ASME Research Department at a nominal charge.

Inspection of Reactor With Isotopes

The largest single industrial collection of radioactive isotopes in the United States, 76,000 millicuries of iridium 192, was used by Isotope Products, Inc. in an inspection of a reactor at the Eastern States Petroleum Company refinery in Houston. It was also the first time that isotopes were used to look for hydrogen blisters in the steel of a refinery reactor unit. The iridium 192 charge was in the form of five capsules, each only ½ inch in length.

The reactor under inspection was 20 feet high and 5 feet, 6 inches in diameter. The walls were 2⅝ inch steel plus five inches of concrete and a ⅛ inch thick chrome steel liner. The job was accomplished in a single shot and took eight hours.

Union Oil To Build New Marine Terminal

Union Oil Company of California has announced plans for a new $5,000,000 marine terminal to be built at Rodeo, in Contra Costa county, California. Construction is to begin immediately and completion is expected by the middle of 1954.

Principal feature of the new terminal will be a steel and concrete pier which will provide loading space to accommodate two ocean tankers on its outside face and five large barges on its inside face.

Pipe lines to handle up to nearly 500,000 barrels daily will be installed on the pier and will be operated by pumps located onshore.

Parsons Offers Fluid Coking Process

The Ralph M. Parsons Company has been selected by Standard Oil Development Company to offer the fluid coking process to the petroleum industry. Parson's services cover process design, engineering, and construction for complete plants utilizing the process.

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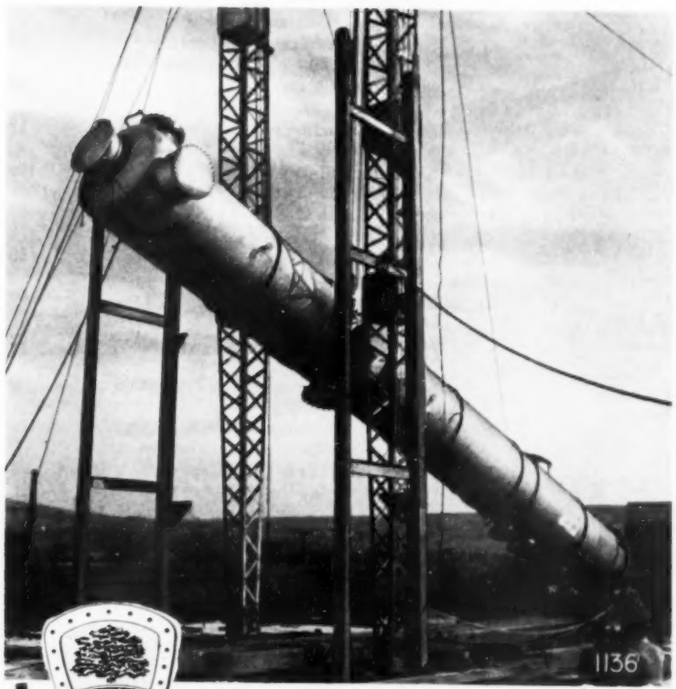

Fractionating column 6'-6" dia. x 65'-0" high made for Foster Wheeler Ltd. for Hess Products Ltd.: Fatty Acid Plant.

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Know the best way to get the best tube steel for you? Ask the experts!

This month's report is on:

SICROMO 2

Has outstanding surface and structural stability at 1200°F. Has better oxidation and corrosion resistance than 2% Cr.-Mo. steel. Recommended for service up to 1200°F. as tubes in cracking coils, reforming units, heat exchangers, vapor line and hot oil piping. Also as return-bend forgings for oil heaters.

ONE OF 24 TIMKEN HIGH TEMPERATURE STEELS

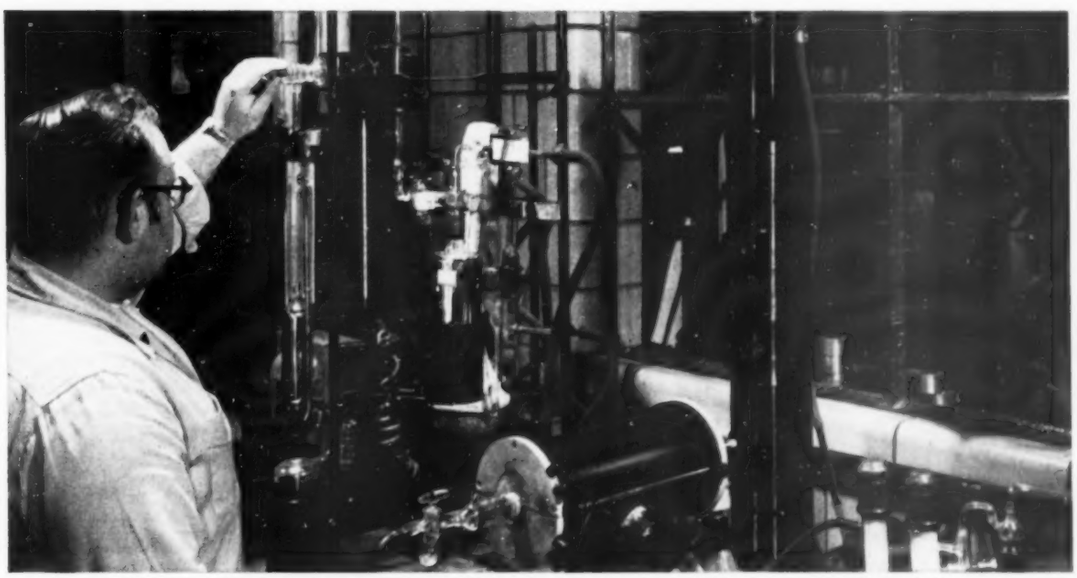
Carbon	Sicromo 2	Sicromo 5S	18-8 Ti
Carbon-Mo.	Sicromo 2½	Sicromo 5MS	16-13-3
DM-2	2½% Cr.-1% Mo.	Sicromo 7	25-20*
Silmo	Sicromo 3	Sicromo 9M	25-12*
DM	4-6% Cr.-Mo.	18-8 Stainless	35-15**
2% Cr.-Mo.	4-6% Cr.-Mo.-Ti.	18-8 Cb	16-25-6**

** Available as seamless tubing on an experimental basis only.*
***Not available as seamless tubing.*

SEVERAL high temperature tube steels may solve your heat, pressure, corrosion and oxidation problems. But only one steel will give you maximum tube life per dollar—the best life/cost ratio.

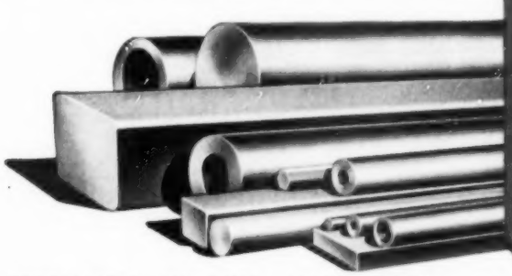
The best way to get this steel is to ask the experts—the metallurgists of The Timken Roller Bearing Company. Backed by more than 20 years of steel research and experience, they're recognized authorities on high temperature steels. With 24 different analyses to choose from, they'll help you select the best tube steel for your particular application. And uniform tube quality is assured by the Timken Company's rigid quality control from melt shop through final tube inspection.

Let our "RSQ"—Research, Supply, Quality—solve your tube problems. *Ask the experts!* The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".



Chlorination apparatus purifies extracted non-metallic residues to determine steel cleanliness. Research like this helps assure the Timken Company's leadership in high temperature steels.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



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STEEL

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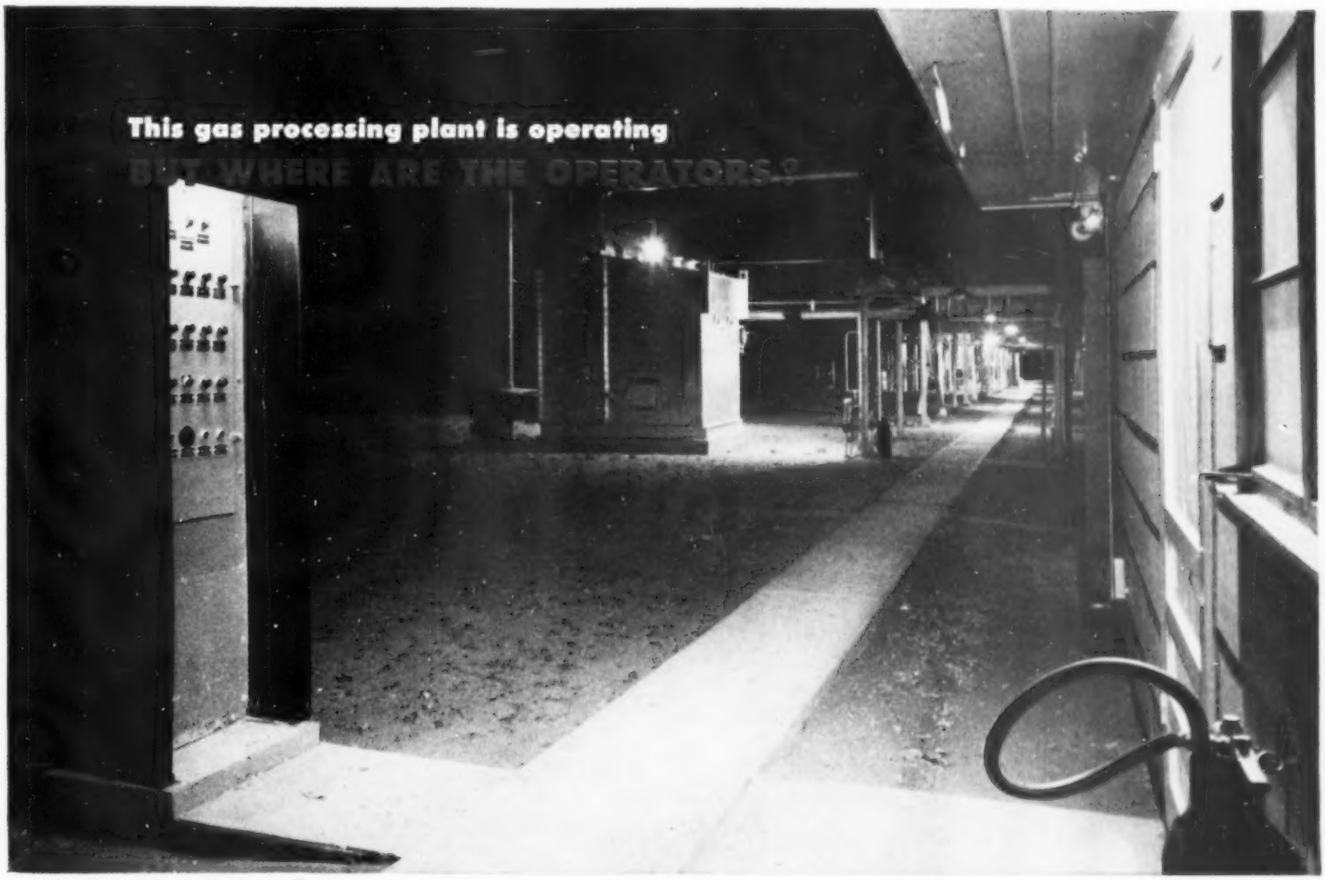


There is only one, and he is HOME ASLEEP!

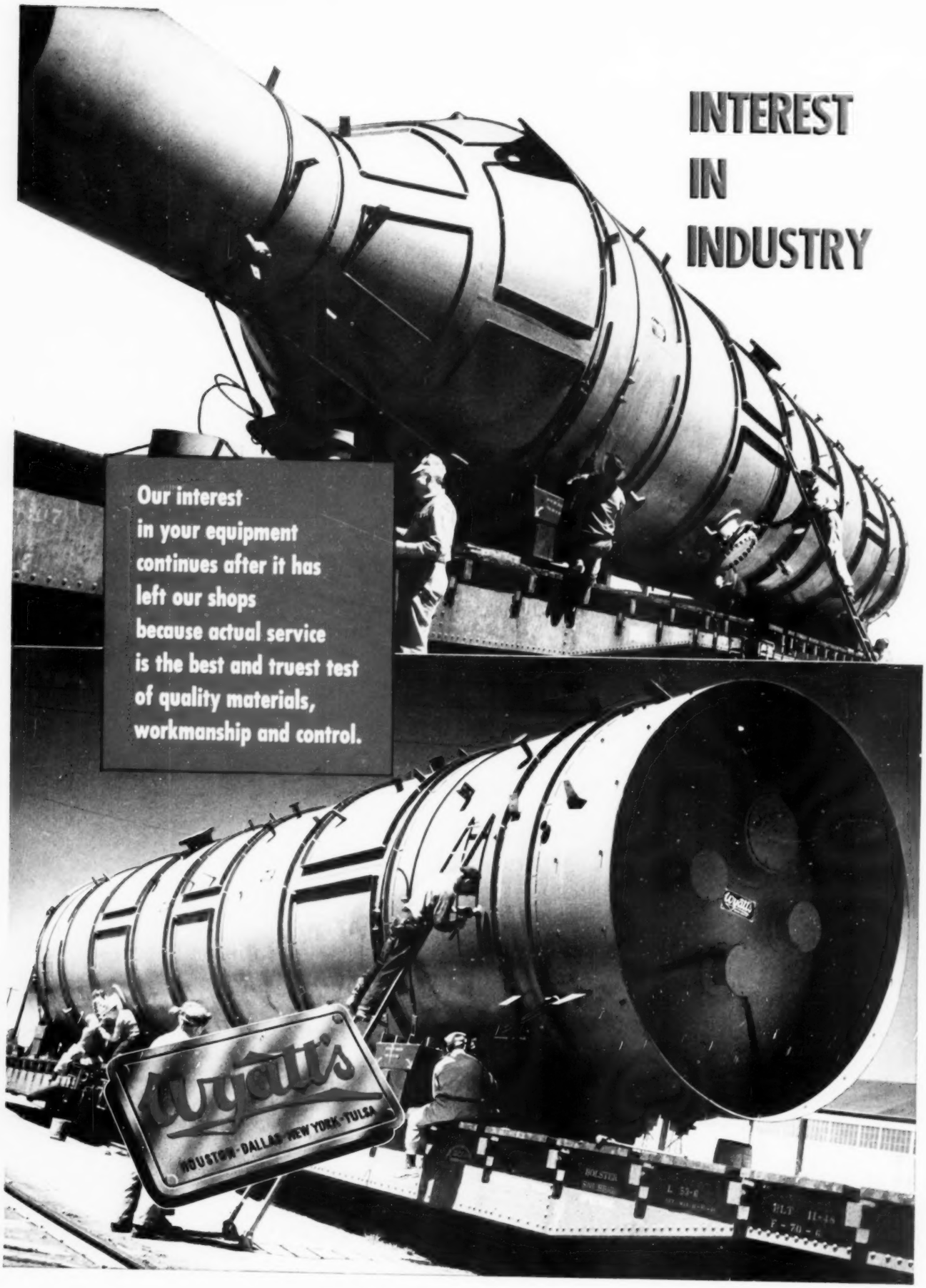
In this self-sufficient plant the "Operators" are built into the plant — a human operator is required only for loading products and routine maintenance. During the night unusual changes in pressures or levels cause the warning ringing of the bedside telephone of the resident operator.

The plant, operating in the Ropes Field of Hockley County, West Texas, is designed to compress and dehydrate 4 million cubic feet of gas per day, extract 67% of the propane, and produce three liquid products totaling 35,000 gallons per day.

The special features to reduce operating costs and minimize capital investment without sacrifice of propane recovery, safety or continuity of operation were developed by HUDSON in collaboration with the engineers of Honolulu Oil Corporation to solve the problem of economically processing small quantities of rich gas.

General view of plant showing HUDSON Combin-aire unit at left.

HUDSON
ENGINEERING CORPORATION
FAIRVIEW STATION • HOUSTON, TEXAS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INDUSTRY
Our interest
in your equipment
continues after it has
left our shops
because actual service
is the best and truest test
of quality materials,
workmanship and control.
Wyatt's
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